NATURE MAGAZINE

NOVEMBER 1925

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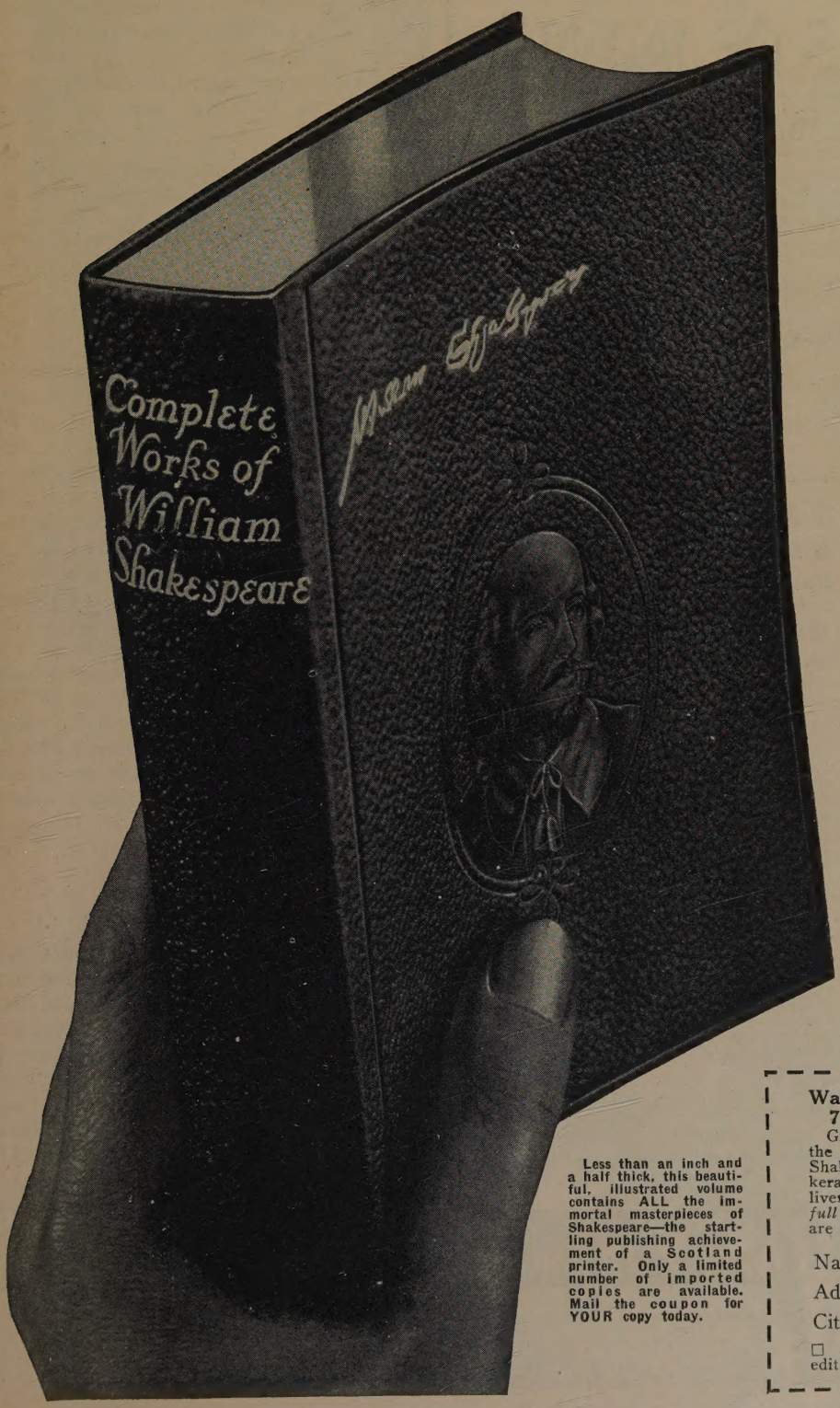

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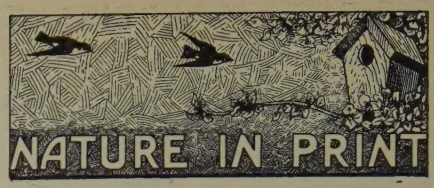

Slow Smoke

Between the two covers of a little volume entitled "Slow Smoke," Lew Sarett has collected some forty poems of the out-of-doors and the wild, and Henry Holt and Company, New York, has brought out the book. Mr. Sarett's poetry has breathed of the open, filled its lungs with the scent of the forest and sedgy lakeside and is therefore charming. The whole appeal of his work is summed up, we feel, in the following stanza from the verse on Trailing Arbutus:

Something in shy arbutus wet with dew
Lays hold of me, something I do not know—
Unless—among these blossoms once I knew
A little boy, oh, long ago.

Teaching Science

In his new book, "Teaching Science in the Schools," Dr. E. R. Downing has made an interesting compilation of much of the current thought on the subject. The title should more properly be "Teaching Science in the Secondary Schools," since it is concerned essentially with secondary school problems. The book will undoubtedly find its place with similar works of Mann, Woodhull, Twiss and Eikenberry, though its general nature forbids its being of the specific value of Mann or Eikenberry. Though it is stated that "85.9 per cent of all high schools in the United States are in villages of less than 2,500 inhabitants, or in rural communities," comparatively little consideration is given to rural problems. About one-seventh of the space is devoted to a useful consideration of science teaching in European schools

---

On Popular Science

The "Book of Popular Science," published by the Grolier Society of New York should make a name for itself in these days of outlines of every imaginable field of thought. The fifteen volumes treat of some thirteen major topics most of which appear in the courses in general science taught in the seventh, eighth and ninth grades. The illustrations are striking and reliable generally. The fact that the major topics are considered to some extent in each volume should make it permissible to use single volumes profitably in case the possession of the whole set is not practicable. The book is, I believe, based to some extent upon a successful English publication of a similar nature. It should be useful in schools and in public and private libraries.

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Two Textbooks

These two manuals, "Primary Nature Study" and "School Nature Study" by Roland Case Ross, assistant supervisor of Nature Study of the Los Angeles schools, should prove particularly useful to teachers of the southwest. The outlines are obviously for the use of teachers rather than of pupils. In addition to providing in a concise manner the subject matter pertinent to the topic under consideration, there appear useful suggestions under the heading of "Pupil Activities." The writer apparently recognizes the futility of expecting the teacher to look up a pretentious list of references and so supplies adequate material for the lesson in the outline itself. "Primary Nature Study" lacks entirely the imaginative appeal which so frequently is useful in working with children of the first three grades. The manuals may be secured from the author at 388 Dearborn Street, Pasadena, Calif.

The Steel Trap

Those who know of the difficulties overcome by the associations which fought for the protection of our songbirds whose feathers were formerly considered necessary to style, will appreciate the problem faced by The Anti-Steel-Trap League. The aims of this League are set forth in a manual which may be secured from the League's president, Dr. Edward Breck, the Army and Navy Club, Washington, D. C. Aside from a few minor inconsistencies, the manual sets forth convincingly the justice of doing away with an atrocious practice which is kept up to meet the demands of style and vanity. It contends that "all the fur needed for those whose activities are in cold climates in winter can easily be procured with traps which kill at once, or by fur farms, or in some other way." The contention of those that hold that the steel trap is the most effective means of capturing fur-bearing animals and opponents of its use must provide a substitute is answered with the statement that no one is under "obligation to provide a substitute for an atrocity." The manual should find a place in the files of all schools and of Nature lovers.

The American Eagle

Dr. Francis Hobart Herrick of Western Reserve University, whose article on the American Eagle was a feature of the September, 1924, issue of NATURE MAGAZINE, has incorporated his remarkable observations of this bird in an attractive little illustrated booklet. This small brochure cannot tell, however, of the hours and days of patience that were spent in observation of the growing family of the eagles that nested on the shores of Lake Erie near Vermilion, Ohio.

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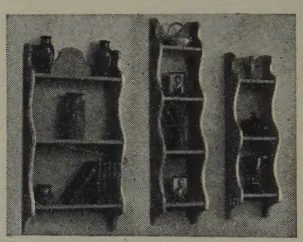

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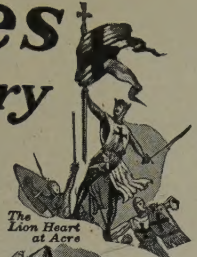

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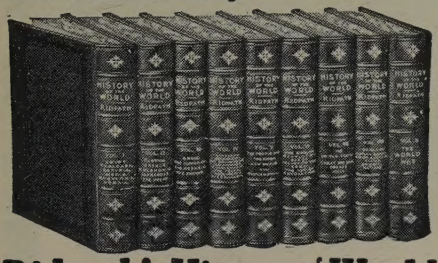

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A Beautiful Reptile

After reading the article by R. N. Davis on "Some Reptiles of Panama" in your September number, I recalled an incident which may be of interest to your readers, writes Mrs. L. W. Seeley, of Pontiac, Mich. When my husband and I were in the little town of Punta Gorda, Fla., about seven years ago, we were somewhat curious to see a specimen of the diamond-back rattlesnake which we had been told were quite numerous in that locality. Our curiosity was gratified one evening when a man brought one to the town, having killed it that day under one of the grapefruit trees he had been trimming. This snake was about six feet long and a fine specimen, I should judge. With this snake he brought another beautiful snake that his wife had killed in their dooryard the same day. No one seemed to know what kind of a snake it was—someone did call it a ribbon snake. It looked just like a string of bright wooden beads to me. About four years later I happened to be reading W. H. Hudson's "Green Mansions," a story of South America, and I found the following description which reminded me of the snake we had seen in Florida:

"A coral snake famed as much for its beauty and singularity as for its deadly character. It was about three feet long and very slim: its ground color, a beautiful vermilion with broad jet black rings at equal distance round its body—each black ring or band divided by a narrow slip of yellow in the middle. The symmetrical pattern and widely contrasting colors would have given it the appearance of an artificial snake made by some fanciful artist, but for the gleam of life in its bright coils. Its fixed eyes, too, were living gems, and from the point of its dangerous arrowhead the glistening tongue flickered ceaselessly."

The Florida coral snake differs from the species described by Hudson in having alternating red and black bands of approximately equal width, separated by narrow yellow bands.

A Fine Memorial

A bird and game sanctuary in memory of Edward MacDowell, the famous musician, has been set aside near Peterborough, N. H. The tract covers six hundred acres. The officers of the Edward MacDowell Association are Howard C. Smith, Benjamin Prince, Howard Mansfield and Mrs. Edward MacDowell.

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Nature Calendar

NOVEMBER

Although many trees and shrubs stand out bare in winter outline, continuously and apparently unceasingly, leaves come fluttering down to the ground. Soon nearly all will have fallen.

The white oak is still resplendent in rich purplish-russet and golden brown.

The leaves of the black oak cling tenaciously; often hanging all winter until pushed off in the spring by the renewing growth.

Closed gentians probably are blooming in sheltered places during the first part of this month.

Ungathered chestnuts are now well concealed beneath a thick carpet of leaves.

The rosettes of biennial weeds lend a fresh greenness to brown autumn woodlands; as do the Christmas fern and polypody.

Witch-hazel pods barrage the woodlands with volleys of seeds. Light yellow and spider-like are the flowers now crowded along its branches.

The beech tree's sinewy trunk, gray bark and finely sprayed branches are beautifully outlined against gray November skies.

The burning bush, hung with flame-colored fruit, is conspicuous along woodland borders.

The insect orchestra is now silent. Now and then one may hear the feeble chirps of a belated ground cricket.

The fall canker-worm now emerging from its pupa is larger than its spring relative.

You are most likely to find the brown cocoons of the promethea moth swinging from twigs of the wild cherry, sassafras, buttonwood and ash.

Most caterpillars are now snugly sheltered in their cocoons but still a few "woolly bears" are roaming about. Probably they are looking for a protected place in which to curl up for the winter.

You will notice that the last birds to leave us for the south are among the first to appear again in the spring.

When the bills of woodcocks and snipes can no longer probe the frost-hardened earth they will journey southward to softer feeding grounds.

By this time most of our junco residents from the deep northern woods have arrived for the winter.

Chipping sparrows are migrating. Gone is the black from their foreheads and they have changed their rufous crown-caps for streaked ones.

European starlings have formed into their winter companies.

Occasional snow flurries, which melt as soon as they touch the ground, are forerunners of winter's fiercer snows.

Early mornings find the ground covered with silver frost.

From now until April is spawning time for cod in New England. A large fish may lay as many as 9,000,000 eggs.

In parts of the west where Wapiti roam, the bugling of the bull elk is now heard. He is in prime condition and ready to challenge all who will to combat.

Beavers are busy repairing their dams and building winter cabins at the edge of the water. The task of laying in winter's supply of birch, poplar, and cotton-wood also takes much of their time.

Color Notes

"The brown of fallen leaves,
The duller brown
Of withered moss
Stubble and bearded sheaves,
And pale light filtering down
The fields across.

"The gray of slender trees,
The softer gray
Of melting skies.
What sobering ecstasies
One drinks on such a day
With chastened eyes!"

—*Charles Wharton Stork.*

Prepared by the Cleveland Museum of Natural History for NATURE MAGAZINE

BRONZED WAYFARER OF THE AIR

"The call of the lost goose, the voice of the flock, merged gradually into silence, shading away until one heard only the ceaseless whisper of the current."

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NATURE MAGAZINE

Vol. VI NOVEMBER, 1925 No. 5

A haze in the far horizon,
The infinite, tender sky,
The ripe rich tints of the cornfields,
And the wild geese sailing high.

And over the highland and lowland
The charm of the goldenrod—
Some of us call it autumn,
While others call it God.

—William Herbert Carruth.

Canada Geese—Trumpets of Dawn

By Ben Hur Lampman

(illustrated by a full-page insert in color from a painting by R. Bruce Horsfall and by drawings)

WE WERE three on a brown knoll of October beside a prairie lake. There was a fresh wind from westward, veering slightly to the north, and ducks were coming from beyond a gray horizon—bluebills for the most part, hardy little adventurers to whom the threat of snowfall was a pleasing jest. And the lake danced, rustling its broidery of rushes and decking itself with foam. There was in the day and the country something of sadness and of regret, but it was very good to be there while the northern flight came down. For there is a trace of his forefathers in the blood of every man, and marshes and wild fowl and the end of autumn stir memories in his veins.

And this I hold to be true, having never known one to whom it did not apply—that none of us may hear the trumpets of the wild geese, brazen and wonderful, without that quick catch at the heart, that instant lifting of the eyes, that amazing and spontaneous tenseness, which are a tribute to the best and bravest bird of all. Wild geese! A continent beneath them, driving northward at the van of spring, or southward as the rearguard of a spent season. They are so masterless, so valiant, so symbolic of the freedom to which we aspire but never quite attain, those bronzed wayfarers of the air. Wild geese! Distant we heard them.

One searched the northern grayness for a long moment ere one made them out, flying in precise formation, with never a straggler and scarcely a perceptible wavering of the V, wind borne as they were. They did not come as the snow geese do, wildly chattering, but timed their flight song with strong resonant voices, no two calling at a time. And larger and ever larger they grew, four-score Canada geese, advancing with the speed of the wind plus the impetus of their own strong pinions, until they were fairly above the prairie lake. They called for their own kind, but only their cousins the ducks rode on the tumbled waves, and the geese held steadily onward. And then—

Midway of the longer flank, and of a sudden, without faltering, one of the great voyageurs folded his wings and fell. Death touched his heart in flight, he plunged downward to the brown rushes, from two hundred yards in air, and spray rose where he fell. There was no gap in the rank as the V winged over us, dwindling away into grayness, trumpet and trumpeter. And when we found the dead goose, as we did by dint of beating about in the chill muck of the rushes, there was blood on his breast, and one might see where shot had cleft the flight feathers. How long had he flown, so wounded, keeping pace with his fellows, driving on and on until the dimness conquered him? There is a Valhalla for such birds as this. The gallantry of the wild goose was brought home to us.

The Canada geese once bred throughout temperate North America. They fare far to the north now when they nest, or tarry only where they are reasonably sure of protection. And the great flocks, as flocks once were, are gone to come no more. There are men who remember the old days in the prairie states, when of any night in spring

or fall children could hear the migrants calling—when the fields were dark with them as they dropped to feed . . . and they were slain by the wagon load, plucked of their feathers and tossed aside as carrion. We were a cruel and wasteful people then, with much of the savage in us. Our books for boys were books which fostered the belief that all wild creatures, save here and there some bird protected by traditional sentiment, were created for slaughter.

And men did shameful things in the name of sportsmanship. There is a man whose name today is known wherever commerce is carried, but in those times he was the spoiled son of a millionaire, and above all else he desired that men should know him for a sportsman. In furtherance of this vanity he caused a gunsmith to make for him a huge swivel-gun, which he mounted in the bow of a launch when he had chosen the lake and the season. At night, as the vast flocks of Canada geese rested on the lake—and the lake, too, is known wherever sportsmen congregate—he sent the launch stealthily among them, played a searchlight upon the huddled, bewildered birds, and opened fire. For years the story of that night remained an epic of slaughter, and even now it deserves not to be forgotten—that we may remember what once we were.

"WE FOUND THE DEAD GOOSE"

"There was blood on his breast, and one might see where shot had cleft the flight feathers."

The wisdom of the Canada goose is second to that of no other American game bird, and for sheer sagacity his only equal is the sandhill crane. In flight or in the field, or at rest on some chosen lake, the geese are always vigilant, and that this duty is well understood, and shared by all, is readily determined by observing a feeding flock. As they glean the stubble there are always lifted heads, glancing here and there, and memorizing, as one might say, the landscape. Unquestionably the vision of the Canada goose is comparable to that of the raptorial birds, for the least of incautious movements often betrays the observer, though he be hidden some hundreds of yards away. The gentle gabble of the contented flock is hushed as the sentinels speak some low word of alarm. All heads are lifted from the stubble, aloft on those slender, serpentine necks. The great birds are motionless. They are rising. Their wings winnow the wind. Now in full flight and climbing they lift the chant of their people.

This is beyond dispute, as all who have lived in regions frequented by Canada geese will bear witness—that by some strange means of divination, bordering close upon telepathy, they often appear to discriminate between men who intend them no harm and those who design their deaths. The flocks will feed contentedly within easy range of a wagon road, on which farm vehicles and pedestrians pass—more, they will permit the farmer to draw near them in the field itself as he pursues his duties. But if a gun is hidden on the plow, or if hunters appear upon the road, they are in flight before a shot can be fired, having seen or sensed the danger. Of the two theories the last is the more tenable, although it is probable that a very high degree of coordinated observation and instinct gives them warning. Or, if you choose, it may indeed be that men send impulses of good or evil before them, and that these wild creatures know because "they know"—as woodsmen would say.

The flock instinct, the desire for gregariousness, is a compelling urge with the Canada goose, as, indeed, it is for most of the geese people. There is nothing animate in Nature more lonely or forlorn than the lone goose, separated from his flock by some misadventure. Sadness and apprehension are in his call as he seeks his fellows and I have seen such a goose in desire for companionship strive to attend a fleet-winged flock of widgeon. He loomed among them as a plow horse among the ponies of Shetland, and his pleadings for comradeship sounded far across the prairie. Dodging, turning, swerving, caring not at all for his heartache, the nimble baldpates outmaneuvered and outstripped him, leaving that disconsolate goose far in their windy wake, dismally honking.

One other time only have I seen waterfowl undertake to force their society upon birds of another species, and I confess I am at loss to account, in that instance, for the motive. A flock of mallards, the necks of the drakes flashing darkly in the wet

pallor of a misty noon, towered above the cottonwoods along the Columbia and held a course across the broad river. With them were two cormorants, those ungainly master divers. Plainly the mallards endeavored to elude the cormorants, but always the sable fishers duplicated the maneuver and rejoined the flock. They passed from sight beyond the tawny foliage of Lady Island, with the cormorants still in pursuit.

If you rise from the golden rushes to send a load of chilled shot hurtling into the flock, and some strong comrade of the company comes crashing down in death, you have slain what? A bird, you say. No, something more than a bird—a personality. Perhaps there must always be killing of game, though it must more and more be tempered with moderation, but as for me I confess I believe there is true sorrow in the flock when a goose falls. For the family fidelity of the Canada goose were worthy of emulation, and the flock spirit—which really is a sort of patriotism—is no less strong and loyal. In defense, of its young, of its mate, the goose seems not to know the meaning of fear, and the proofs of its affection and sagacity are so evident, so compelling, that one must admit the reasonableness of that theory which holds that to geese the goose is indeed an individual, a comrade, friend, kinsman or sweetheart. As to the distress of that goose which has been separated from his companions—and I employ the masculine pronoun merely for the sake of convenience—I have heard geese give voice to it time and again.

"FELL PLUMMET-WISE"

"After an interminable moment the sound of two shots, hollow as shadows."

A flock flew low over the Columbia, and, as I fished, the mellow music of its trumpets came to me across the river. The flock flew low because it had no fear of the river, nor of the pale sand bar at midstream. Its members were taking counsel as to the precise area of water on which the flock might rest in safety. The sand bar lay flat in the candid sunshine. But of a sudden a man rose up from his hidden pit in the bar, and the geese clamored as they mounted. He was no more than a pigmy in the distance, with tiny puffs of smoke blown landward. Two geese fell plummet-wise. And after an interminable moment the sound of two shots, hollow as shadows. The midget figure was even then plodding toward his kill. As for the flock it bore eastward high over the Columbia—save for a single bird that must have passed above the gunner ere he fired. This goose, at any rate, drove to the west above and along the river, and at every wing stroke the distance between bird and flock widened. They faded from sight. The call of the lost goose, the voice of the flock, merged gradually into silence, shading away until one heard only the ceaseless whisper of the current.

But presently, far to the west, the call came faintly forth again and grew in volume. The lost goose was descried as a frantic hurrying speck, tacking hither and thither. His cry was rapidly repeated, which is not the habit of the Canadas, and beyond all misunderstanding it was not only plaintive but perturbed. At a quarter mile in air he drove past, seeking far to eastward, only to retrace his course, constantly calling, and to retrace it time and again. He heard them a full minute before we did, for on the instant his cry was joyous and confident and his flight to the east took a determined and resolute direction. And then, distant as dream, faint and far, we caught the bugles of the returning flock. Were they, too, searching? But surely there was elation in their quickened clamor when the lost one literally hurled himself among them, and took his rightful place. They rose to the flight lane. The V took shape, and southward they drifted, southward. Wild geese!

Few wild fowl—and surely they are wild, as wild as they are free—so readily embrace domestication as does the Canada goose. This, too, argues for

their sagacity. In districts where the Canadas nest, domesticated wild birds are common in country farmyards, and some of the Canada geese, so much more finely modeled, so infinitely more patrician than their tame cousins, were not reared from the egg beneath a brooding hen, but were taken captive as adults—when at the moulting season they were bereft of their flight feathers.

I once knew such a goose. She was a village character, and owned no master. It was her whim, for real or fancied kindness bestowed, regularly to elect a patron and to roost upon the back stoop of his home. Neither blows nor hard language could drive her thence, for she was feminine to her heart's core and her affections were not lightly bestowed. For all trains, freight or passenger, she nourished an incurable and mysterious antipathy. Before you heard the distant hooting of the whistle, the rumbling of the wheels, that goose announced the enemy. Midnight and dawn were shattered by her strident protests as each train approached, passed and rumbled away. Of sleep there was none. Such was the price favorites paid for her favor. In the mercy and justice of Providence, as I recall it, she was kidnaped by the pirate crew of a freight, who long had desired her as a mascot. Yes, such was the eternal fitness of things. She passed out of our town and our lives, shouting like a virago, not less than three brawny brakemen wrestling with those flailing wings. I have no doubt she found a home, or several. She was a character, and characters are not for stew pots.

Wild geese. Save for the crane no bird of our continent surpasses them in wisdom, in courage, in discipline, in sentiment. And of all geese the Canada is first. The snow geese form a white mob of eager chatterboxes, gabbling of the home no one of us ever has seen. But the great honker, holding his ordered company to the lane of flight, predetermined, charted, has the qualities of true avian greatness. No man may hear the trumpets of the flock without a tug at the heart, and a dimness of old racial memories. I say this who have asked the question of many men. They are all, butcher and baker, laborer and landlord, lout and elegant, under the spell of music. Wild geese, trumpets of dawn!

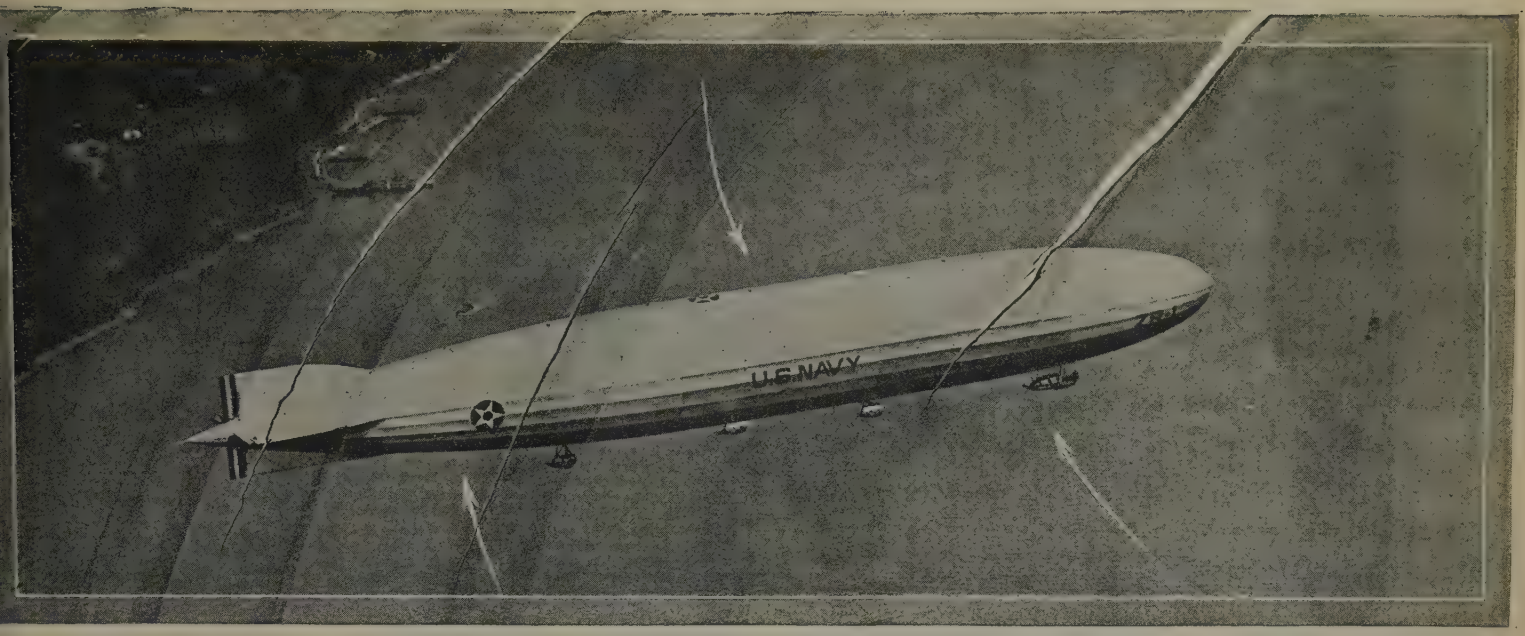
Shadows of Beauty

By Don C. Lyons

ONE OF the more recent of interesting methods of studying the beauties of nature is with the X-ray, or radiography. The first radiographic work done in the field of biology was done soon after the discovery of the penetrating power of the X-ray by Röntgen in 1895. At that time a number of interesting plates of the lobster, crab and frogs were made. Attempts to radiograph small insects and flowers were failures.

About 1913, with improvements in apparatus and in technic, the first radiograms of flowers were produced. Considerable difference exists in the amounts of mineral salts and their densities in various parts of the flower which makes it possible to obtain radiographs. Now it is possible to obtain good detail pictures of the most delicate of structures in the plant without tearing them apart.

The illustration is a radiograph of the peony. Two different stages of development are shown: first, a tight, compact bud, so dense that the X-ray cannot differentiate the structures; and second, the flower in full bloom. This illustration makes one appreciate more than ever the delicacy of Nature's construction work. They are indeed shadows of beauty, revealing the structure hidden under the beautiful exterior, and giving us a new viewpoint of appreciation of the marvels of Nature, as shown to us by man's mechanical ingenuity. Still there remain mysteries to solve.



WHAT MAY HAVE HAPPENED TO THE *SHENANDOAH* OFFICIAL PHOTOGRAPH, U. S. NAVY

One probable explanation of the air disaster is that the ship was caught between up-currents and down-currents indicated by the arrows and between these forces was broken into pieces.

Who's Who Among the Storms

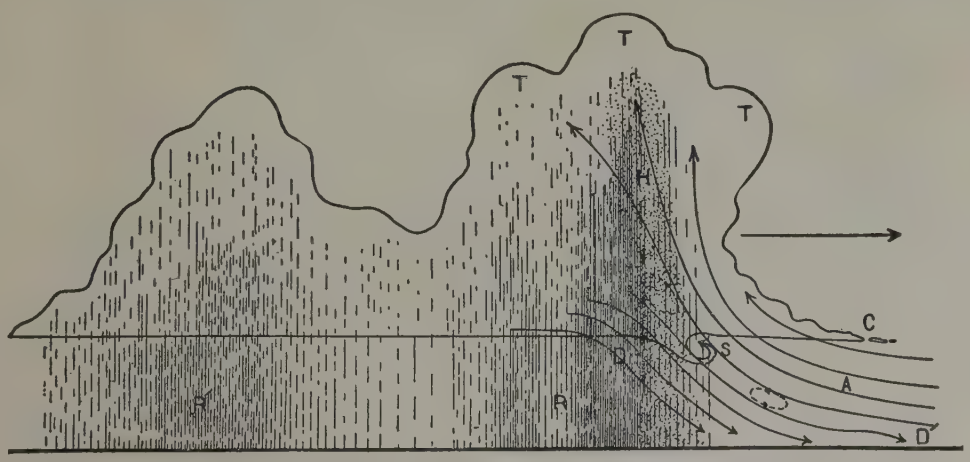
By CHARLES FITZHUGH TALMAN

United States Weather Bureau

IN THE early morning of the third of September of this year a severe squall was raging in mid-air over southeastern Ohio. In its grasp was the American naval airship *Shenandoah*. Caught in the updraft of the storm, the ship was driven aloft from an altitude of 3,000 feet to an altitude of 7,500 feet and then broke to pieces, presumably under the strain of winds blowing upward and downward at the same time—or at any rate with very different vertical velocities—on different parts of her long hull. This disaster, costing the lives of the commander and thirteen others, was laid at the door of a "line-squall" by certain meteorologists, and the use of this term led to a curious misunderstanding.

It is a common belief that spells of stormy weather are likely to occur about the time of the equinoxes, as a result of the sun's crossing of the "line" (i.e., the equator). Though this idea has no scientific standing, "equinoctial storms," alias "line storms," are much more familiar to the public than the authentic occurrence which, on account of its elongated shape, is called in meteorology a "line-squall." Thus it happened that the *Shenandoah* disaster was quite widely attributed to an equinoctial storm! There are no such storms, old school books notwithstanding.

Statistics show that there is no maximum of storm frequency, either in this country or in Europe, close to the date of either equinox. Of course in the long run many storms do occur about these dates, just as they occur at all other times of the year, but there is no scientific reason for supposing that their occurrence can be connected in any way with the sun's passage over what



VERTICAL CROSS-SECTION OF A THUNDERSTORM

The place of greatest danger for aircraft is at S, between strong up-blowing winds A and down-blowing winds D. Drawn by W. J. Humphreys.

the schoolboy described as "a menagerie lion running around the earth." In this country an "equinoctial" is looked for particularly in the autumn. The autumnal equinox occurs during the season of West India hurricanes, and it occasionally happens that storms of this character sweep up our eastern seaboard within a week or two of the date in question, extending their influence far inland. These events have probably helped to foster the widespread belief in an autumnal equinoctial storm.

To return to the *Shenandoah*. An ordinary balloon or aeroplane would not have been exposed to a similar strain and would probably have weathered the gale. In fact, part of the wrecked airship, containing some of the gasbags, was wafted to earth twelve miles from the scene of the disaster, carrying several members of the crew to a safe landing. The squall that caused this tragedy of the air takes its place in the catalog of historic storms. It brought to general knowledge the fact, previously little realized except by weathermen and airmen, that storms can wreak their fury by blowing vertically as well as horizontally. It also naturalized the term "line-squall" in the popular vocabulary.

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RUIN WROUGHT IN ONE BRIEF MINUTE

The Longfellow schoolhouse, Murphysboro, Ill., after the great Middle West tornado of March 18, 1925.

PHOTOGRAPH MT. WILSON OBSERVATORY

THE MIGHTIEST STORMS KNOWN TO SCIENCE

That sun spots are really gigantic tornadoes in the solar atmosphere is shown by photographs taken with the spectroheliograph.

The *"Shenandoah* Squall" revives memories of another historic storm. On the afternoon of March 24, 1878, the frigate *Eurydice,* of the British Navy, homeward bound from the West Indies, was off Ventnor, in the Isle of Wight, running with all sails set before a moderate westerly wind. Suddenly, without the slightest warning, she was struck by a furious squall from the northwest. Before sail could be shortened she heeled over, water poured into her open ports, and she speedily went down with all hands. The squall lasted but a few minutes. It was accompanied by snow, but was preceded and followed by clear skies.

While this event, viewed merely as a disaster, was not of great importance in naval annals, the *"Eurydice* Squall" is a landmark in the history of meteorology. Reports collected from various places showed that the storm was not an isolated disturbance, but that it swept over the British Isles in a long line, moving broadside on, the line being about 400 miles in length and only two or three miles in breadth. Meteorologists who investigated the storm described it as a "line of squalls," a term that was soon afterward shortened to "line-squall." The scientific study of

squalls, undertaken at that time, has been in progress ever since.

We now know that a squall, whether it be a small local occurrence or extend along an advancing front of hundreds of miles in length, consists of a downrush of cold air, which underruns and pushes upward an opposing stream of warmer air. The vertical movements of the wind are the most important feature of such a storm though they are not apparent to an observer at the earth's surface. The observer, so located, is aware of a sudden blast of cool air blowing in a direction different from that of the wind that previously prevailed. Generally he sees an advancing strip of low cloud, lying across the wind, and appearing arch-shaped on account of perspective. At sea a line of ruffled water marks the progress of the squall. Thunder and lightning frequently accompany squalls, though they are as often lacking. A line-squall may assume the character of a full-fledged thunderstorm at some points along its front and not at others. A local thundershower, resulting from overheating of the ground, is nearly always attended by a typical squall wind, the down-rush of air in this case being due to the cooling effect of the rain. On the other hand, squalls of "cyclonic" origin—i.e., due to widespread movements of the atmosphere rather than local causes—may produce the electrical features of a thunderstorm.

Violent upward and downward movements of the air prevail in all squalls and thunderstorms. This fact has been known for many years, but it has only recently assumed practical importance. Formerly only the birds and occasional balloonists were whirled aloft or dashed downward by vertical gales, but today such gales threaten the lives of an army of aeronauts.

Squalls, like tornadoes, are of such brief duration and generally of such limited area that they defy prediction by means of the ordinary machinery of weather forecasting. In the summer of 1909 there were many flights of aircraft in the vicinity of Frankfort-on-the-Main in connection with an international aeronautical exposition. Dr. Franz Linke, one of the pioneers of aeronautical meteorology, organized a local squall-warning service for the protection of these craft. He enlisted a large corps of observers in the region about Frankfort to keep a lookout for squalls and thunderstorms and to report their occurrence by telephone. Thanks to these arrangements, nearly all of the thirty-seven thundersqualls that reached Frankfort during the three months of the exposition were duly heralded an hour or more before their arrival, and there were no casualties among the airmen. A similar plan has been carried out in conjunction with other aeronautical meets abroad, and formed part of the system of protecting observation balloons along the battle lines during the World War. It should be noted that this plan does not involve the prediction of squalls, but merely their observation after they have formed. It requires the services of observers posted short distances apart

THE DEADLY "LEE SHORE"

A vessel stranded and breaking up after an encounter with a gale on the coast of California where no few have met like fate.

over the whole area in which protection is to be afforded and is feasible only as a temporary and small-scale undertaking, as the cost of a permanent organization large enough for the general safeguarding of aircraft would be enormous.

Although our ancestors of a century or more ago were familiar with the existence of small whirlwinds, they supposed that the wind in more extensive storms blew in a nearly straight line and that the direction of the wind observed at any particular place was the direction in which the storm was traveling. One of the first persons to dispute this idea was Benjamin Franklin. Writing from London in 1760, he says:

"About twenty years ago, a few more or less, we were to have an eclipse of the moon at Philadelphia on a Friday evening about nine o'clock. I intended to observe it, but was prevented by a northeast storm, which came on about seven, with thick clouds as usual, that quite obscured the whole hemisphere. Yet when the post brought us the Boston newspaper, giving an account of the effect of the same storm in those parts, I found the beginning of the eclipse had been well observed there, though Boston lies northeast of Philadelphia about 400 miles. This puzzled me, because the storm began with us so soon as to prevent any observation, and, being a northeast storm, I imagined it must have begun rather sooner in places farther northeast than it did in Philadelphia. I therefore mentioned it in a letter to my brother, who lived at Boston, and he informed me the storm did not begin with them until near eleven o'clock, so that they had a good observation of the eclipse; and when comparing all other accounts I received from the several colonies of the time of beginning of the same storm, and since that of other storms of the same kind, I found the beginning to be always later the farther northeastward."

THIS DID NOT HAPPEN IN KANSAS

A storm near Palmanova, Italy, on August 29, 1679, as pictured in a German work published in 1680.

PHOTOGRAPH U. S. WEATHER BUREAU

THE TERROR OF THE PLAINS

A tornado darkening the sky as it passed east of St. Joseph, Mo., on June 24, 1924. These storms are well called "terrors."

This was a partial anticipation of what was afterward called the Law of Storms, according to which the air in a storm tends to gyrate around a center while the center itself moves forward. In spite of certain misconceptions that long prevailed concerning the operation of this law, it provided a basis for scientific weather forecasting, and a knowledge of it on the part of mariners has been the means of averting innumerable shipwrecks. Hence "Franklin's Storm," which occurred in 1743, is one of the famous events in the history of weather.

Another landmark, even more intimately connected with the development of weather forecasting, is the "Crimean Storm" of November, 1854. This tempest, which raged over the Black Sea and

A SANDSTORM IN TEXAS

The winds at work playing a much-dreaded game, driving the fine, cutting particles ahead of them in penetrating clouds. Sandstorms are not confined to the deserts alone.

played havoc with the fleets and camps of the allied forces engaged in the Crimean War, is graphically described by Kinglake in his "Invasion of the Crimea," but not a word is said in this description about the important scientific undertaking to which it gave rise. The French astronomer Le Verrier, director of the Observatory of Paris, collected information concerning the progress of the storm over Europe which convinced him that if telegraphic reports from the western part of its course had been available its disastrous effects might have been averted. As a result of this inquiry, he drew up plans for an international telegraphic storm-warning service, which was established by the French Government, with the cooperation of other European countries, in 1855. Within the next two decades nearly all the civilized countries of the world organized similar services of their own, and the scope of these undertakings was enlarged to include a general system of weather forecasting from charts based on telegraphic weather reports. The radio is now helpful. Of course all these things would have eventually come about even if there had been no "Crimean Storm," but the connection of this event with Le Verrier's pioneer service ensures it a permanent place in the annals of meteorology. The gale that wrecked the steamship *Royal Charter* on the coast of Wales, October 26, 1859, with a loss of 446 lives, enjoys a somewhat similar renown, because of the charts of the storm prepared by Admiral Robert FitzRoy.

In addition to the storms already mentioned, the following are among those that figure prominently in works on meteorology:

The "Great Storm" of 1703 is supposed to have been the most severe tempest that ever visited the British Isles and forms the subject of an interesting book by Defoe, the author of "Robinson Crusoe." The Barbados Hurricane of 1780 was probably the most destructive hurricane that has occurred in the West Indies. Saxby's Gale swept over eastern Canada with terrific force October 4, 1869. It owes its name to the fact that it was predicted by a Lieutenant Saxby, of the British Navy.

In the Backergunge Cyclone, October, 1876, more than 100,000 people were drowned by the storm waves over the Ganges Delta. In the Tay Bridge Disaster of December 28, 1879, the bridge over the Firth of Tay, in Scotland, was blown down while a passenger train was passing over it.

The Blizzard of March 11–14, 1888, also known as the "Great March Blizzard," the "New York Blizzard," and, in New Hampshire, as the "Town-Meeting Storm," is historic. The Samoa Hurricane of March 16, 1889, wrecked American and German warships in the harbor of Apia, with heavy loss of life. The St. Louis Tornado of May 27, 1896, was the most destructive of the three tornadoes that have occurred in large American cities, the others being the Louisville Tornado of 1890 and the Omaha Tornado of 1913.

The Portland Storm of November 26–27, 1898, is the classic example of the danger of ignoring storm signals. The steamer *Portland,* which furnished the object-lesson in this case, was one of more than 140 vessels wrecked by the storm on the New England coast. In the Galveston Hurricane, September 8, 1900, there was great loss of life and property. Loss was by water rather than wind. Another hurricane came in August, 1915.

Master Architects of the Jungle

By PAUL GRISWOLD HOWES

Assistant Curator, Bruce Museum, Greenwich, Connecticut

(PHOTOGRAPHS BY THE AUTHOR)

IT IS always a rare treat to walk in a jungle. The unexpected is forever turning up, and one's mood in general cannot well help responding to the strange noises, the ever-changing odors and the glory of these humid, earthly paradises.

The jungle is filled with artisans, great and small. There are the weird frogs that make hollows, and fill them with elusive froth that their tadpoles may have home-made ponds of their own. There are snakes of emerald, that climb through the branches and foliage with the ease of water running down hill. There are the giant armadillos, whose huge burrows one might crawl into with ease. There are Indians who construct neat shelters and birds endless whose homes far surpass them, but of all the jungle children none are the peers of the social and solitary wasps in the art of designing and building. Wasps are the master architects of the jungle.

Masons, tailors, carpenters, decorators, paper manufacturers and builders of skyscrapers —all of these trades and many more are open secrets among the wasps. There appears to be almost an aesthetic sense among some species, for I have found the exquisite homes of the Nectarina wasps so beautifully decorated in color that I could scarcely believe my eyes.

These little wasps are found in colonies. They are rather timid and seldom sting. One may disturb their nests with impunity. They are really cowards. The nests are of paper, constructed by macerating wood pulp into paper ribbon. The color of this basic material in the case of the species in question is coppery-brown. When the nest is almost finished it is beautifully decorated by the addition of stripes and bands of pure white. These are laid on in interesting designs, as the illustrations show. The bottom of the nest is pure white as a rule, but in one memorable case all the white portions were washed with the most delicate shades of pink and green.

VEGETABLE JUGS OF COMMON JUNGLE WASP

These are bright green when fresh, but the strips of material soon turn black and hard.

(ENLARGED FOUR TIMES)

Within the nests are tiers of hexagonal cells of paper, wherein the young wasps are reared, after the fashion of the other paper-wasps.

Hanging from the under sides of forest leaves, often in the deepest jungle, one sometimes finds the minute nests of Microstigmus wasps. There are several varieties of nests, but the most wonderful is a hanging affair made of bits of lichen and wood, stuck together perhaps with a personal glue of the insect. The nests are like those of titmice, on a minute scale, measuring perhaps a little over a quarter of an inch in length, but suspended on a stem several inches long. The nest, therefore, floats about in the slightest breeze, a protecting measure, perhaps, from various enemies.

The tiny insect that constructs this wonder of nature could sit comfortably upon the head of a pin. She is a soli-

tary species, living by herself and doing her own work. A very interesting fact is that the tiny cells within the nest are stored with Collembolids, or Springtails, one of the most primitive forms of insect life. A ball of these is gathered by the mature wasp, and after depositing them in a cell she lays one egg upon each mass. The larva then feeds upon the concentrated provisions, as do other solitary wasps. Microstigmus is utterly unafraid of human beings and a most lovable little creature.

Jug-makers are very numerous in the tropics, especially the insects belonging to the family Eumenidae. The jugs may be made of clay or vegetable material, and are often of great beauty. I have seen a row of these little nest-pots placed upon a window cord, nearly all of them having been made from a different shade of mortar. Many are very minute like the two shown in the illustration, while others are larger and rougher, such as those of Zethus, who fashions her pots of succulent vegetable strips that later harden and become as tough as leather.

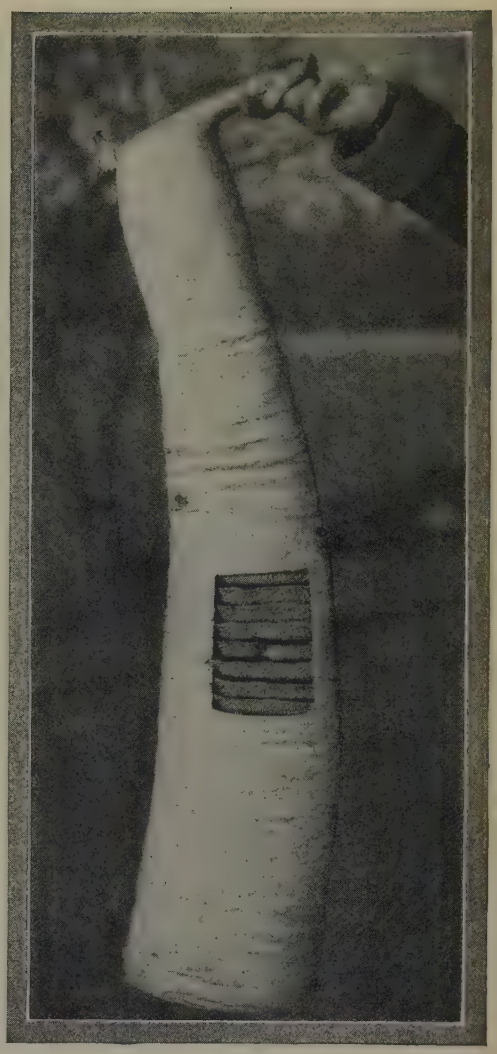
A SUSPENDED NEST

This strange nest is built like an inverted pair of stairs.

(ENLARGED FOUR TIMES)

The most delicate of all the clay nests are those made by different small members of the Trypoxylonidae. These little wasps go about in happy mated pairs, the male guarding the home while the female is away in search of mortar or provisions for the young, which are usually spiders.

The walls of their nests are often as thin as tissue paper, and it is surprising how they withstand the tropical downpours. One Trypoxylon, many of whose nests I found, built a number of clay tubes, piled one upon another, and the entire surface of the domicile was adorned with hundreds of minute spines, also of clay. These were constructed with the minutest care by the insects, and probably served the purpose of preventing parasites from reaching the cells with their ovipositors.



A WASP SKYSCRAPER

This huge nest is made from a pulp that dries as hard as heavy waterproof cardboard. Note cut-away section showing cells.

Of paper nests, one finds a great variety in tropical countries. Most of these appear to belong to social species, and I do not ever remember finding one constructed by a solitary wasp. Some of the paper ones are simply single rows of cells, set one behind the next, like a pair of inverted stairs. Others are fan-shaped, globular, or flat masses of cells covered with paper envelopes. I found one that was suspended on a tendril fifteen inches long, composed of gray and brown paper in stripes like those of an awning. Still another, and the most remarkable of all, was placed upon a dead palm frond, with which it blended so perfectly as to be almost invisible at a short distance.

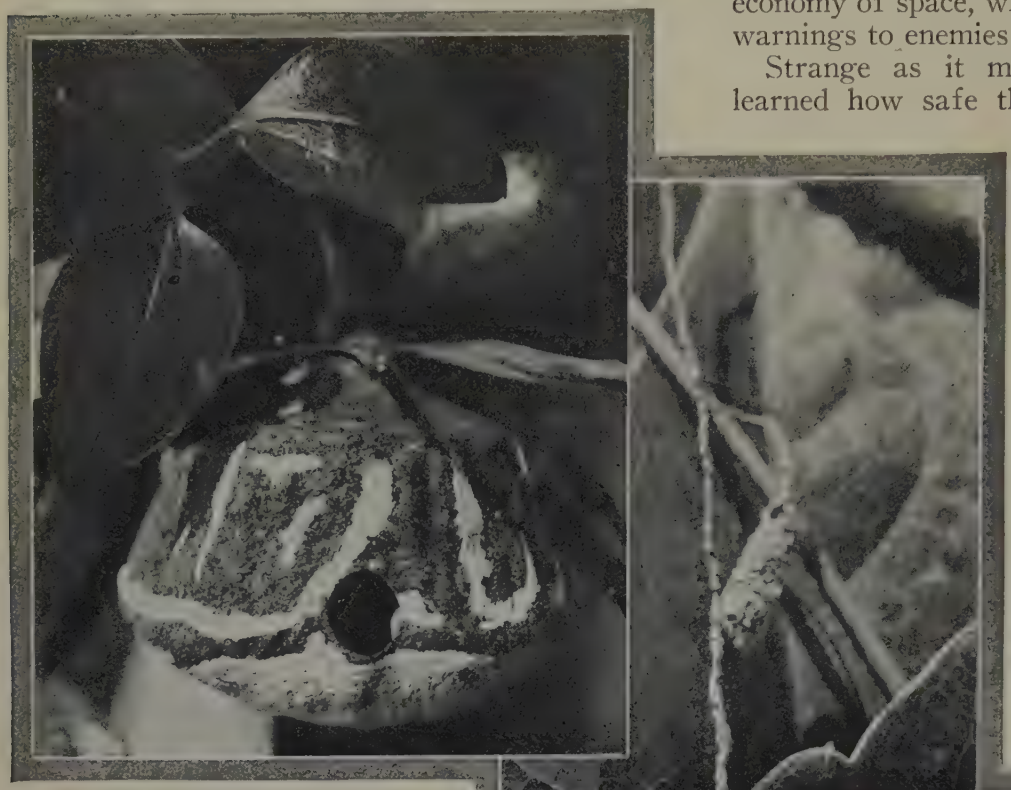
This nest was seven inches long and three and a half inches in width, but very shallow. The walls were perhaps half an inch in height and the roof rather convex, the entire nest reminding me of a rather flat tent. The remarkable thing about this was that the surface that faced the sky was thickly set with minute windows, not open ones, but tight waterproof openings, glazed with a strange glassy substance that admitted light to the entire cell mass

within! If one looks in the doorway of this nest, holding the roof towards the light, the view is much like the interior of a finely lighted factory. Whether these lights are intentionally arranged for illuminating purposes or not, I cannot say, but in any event this species builds a unique nest.

the individual cells number ten or twelve thousand. At one side, near the base of the nest, a number of entrances are situated, the edges of which are worn down from the endless comings and goings of the wasps.

The designs of these nests are wonderful. Within, they are arranged for simplicity and economy of space, while their exteriors are brilliant warnings to enemies of the insects.

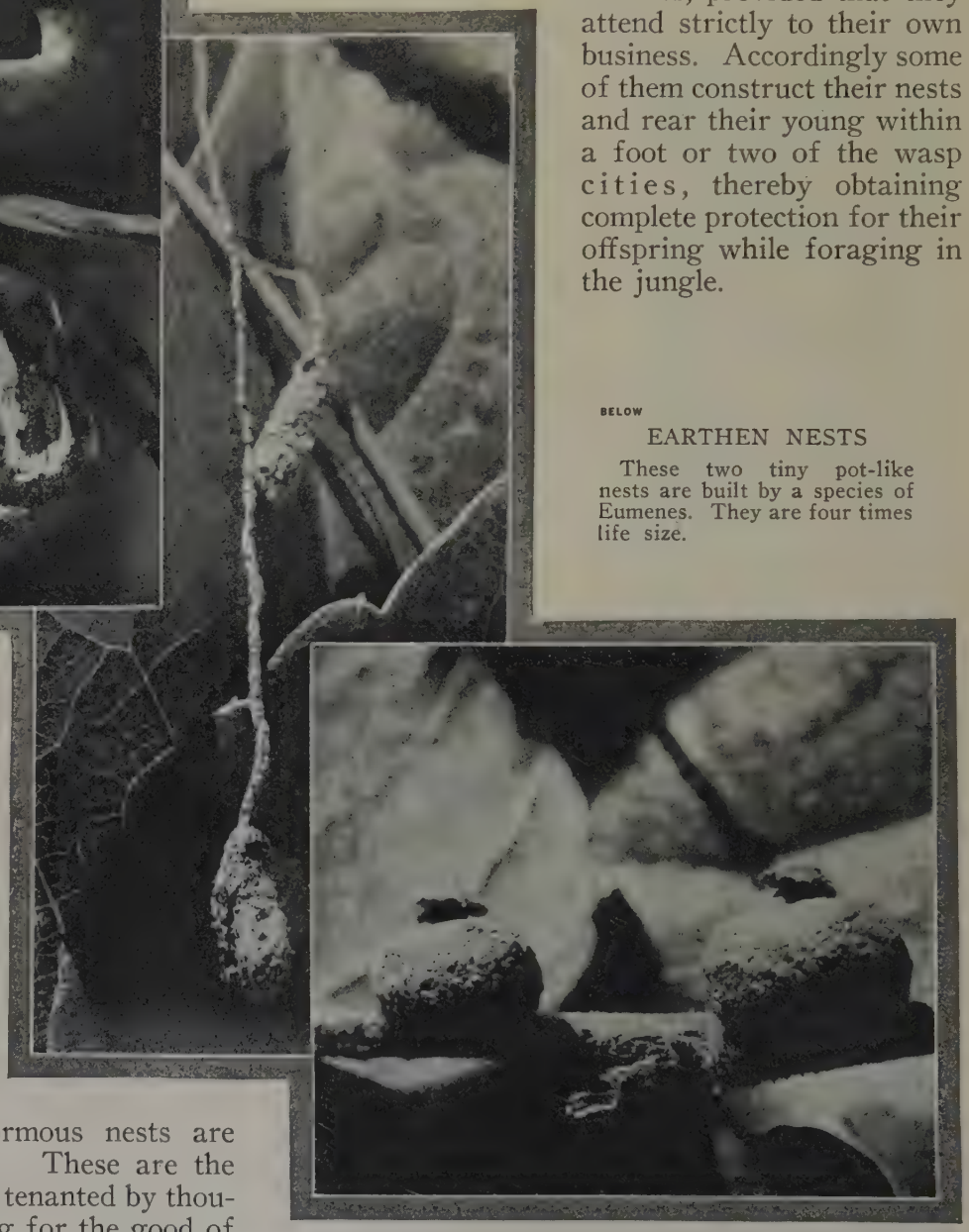
Strange as it may seem, certain birds have learned how safe they may be near these great colonies, provided that they attend strictly to their own business. Accordingly some of them construct their nests and rear their young within a foot or two of the wasp cities, thereby obtaining complete protection for their offspring while foraging in the jungle.



BELOW

EARTHEN NESTS

These two tiny pot-like nests are built by a species of Eumenes. They are four times life size.



ABOVE

NEST OF PAINTED NEST WASP

Note the colorful banding and other devices of decoration.

MIDDLE

SUSPENDED NESTS

These are made by the Microstigmus wasps and are like minute nests of titmice.

(ENLARGED FOUR TIMES)

In Colombia and Brazil, enormous nests are found belonging to social wasps. These are the "skyscrapers" of the insect world, tenanted by thousands of individuals, each working for the good of the colony. Some of them, like that in the illustration, are four feet or more in length. The material of which they are made is a beautiful cream-colored pulp as tough as very heavy cardboard, and thoroughly weather-proof. Within are the tiers of cells usual with the social species, and probably

The nests that I have described are but a few picked at random from the many varieties that I have observed during my field experience. There are endless other forms waiting for those who are fortunate enough to visit the lovely jungle habitats of these master architects of wondrous buildings.

Famous Fishes of the Sea

By
CAPTAIN J. MENANDER
Of the Explorers' Club

STING RAY
With its wing-like breast fins this fish practically flies through the water.

DURING the evolution of the animals now living on the earth, the more conspicuous individuals of the various species as a rule were unable to survive in their struggle for existence. Thus only the species least conspicuous in form and color survived to propagate their kind, unless they happened to be protected in some other way. In this way most fish have by Nature been compelled to evolve a color that blends more or less with the general color scheme of the background, against which they are seen. Roaming fish, such as mackerel, flying fish and herring, which live at the surface, are iridescent blue on the back with silvery sides and white below. The coloration of the back is a matter of luster, not of pigment, so that the color changes with the illumination. When the birds look down on these fish from above, the color blends with that of the sea. On the other hand, it is very difficult for the marine enemies of these fish to discern them from the surrounding water.

Flounders and skates have backs colored gray, brown or yellow, often with different markings, to resemble the bottom on which they live. The kelp fish of the California coast, sargasso fish, sea horse and other pipe fish resort to mimicry in color as well as shape to such an extent that they are practically invisible amongst the seaweed. Lump fish and angler fish are difficult to differentiate from the rocks and stones amongst which they lie in ambush for their prey.

The depth in which the fish lives materially influences the color. The red rays of the sunlight do not penetrate below 1,600 feet. Blue and violet rays go farther down. At 3,000 feet the ultra-violet rays, invisible to our eye, are perceptible. No rays of sunlight penetrate below 6,000 feet. Iridescent and silvery fish all live above the 1,600 foot level. The black and red fish live farther down, where absence of red light makes even the red fish invisible.

Many species of fish can change color at will to suit temporary needs. Experiments in aquaria have shown that the changes in color depend entirely upon the sight of the individual, since the color of blind specimens remains unaffected by changes in the color of their environment. The method by which a fish changes color is well known. The color cells in the skin may contain red, orange, yellow and black pigments, and the variations of color result from muscular action, conscious or subconscious, upon one or more of the color cells. The changes of color, generally under the control of the individual, are chiefly made for the purpose of concealment; but they are also made for many other reasons, including the capture of prey, for mimicry, or for courtship.

Fish inhabiting the northern latitudes seldom have brilliant colors. Many of them, however, are able slowly and gradually to change their protective coloration. It has been noted that, when a flounder or a skate is shifted from a sea bottom of one color to one of a different hue, the fish in a few days accommodates its color to that of the new environment. Some northern fish have very distinct markings which they are capable of varying almost instantaneously, and in this way they can immediately accommodate themselves to different backgrounds as they move from place to place.

In tropical fish the changes of color are sudden,

or actually instantaneous. As an example the Nassau grouper, which lives in the West Indian waters and amongst the Florida reefs, is worthy of special mention. This fish, which reaches the weight of fifty pounds, is called the chameleon of the sea, and it is claimed that it can assume eight different color-phases in as many minutes. Often the writer has seen it change color from light gray to dark brown, with variations of specks and stripes, coming and going like the blush on a girl's cheek.

These colorations are, in some way or other, protective. The vivid colors or patterns of contrasting brilliant colors of the coral-reef fish can, however, in no way be called protective. Instead, they make their wearers conspicuous against the dull and nearly uniformly colored background of the coral reefs amongst which they live. These fish in many cases rival butterflies and tropical birds in colors. They feed, as a rule, on small and, in many instances, immobile or slowly moving victims which are unable to escape from their conspicuous enemies, even if they are able to see them. Coral-reef fish are very agile, but they do not venture far from the reefs, where they feed in a browsing fashion. If approached by an enemy, they can dart into a crevice in the reef, where their larger pursuer is unable to follow. Since these fish are in no need of protective coloration, Nature has not weeded out the conspicuous individuals but has given them the opportunity to reproduce themselves.

Only in the close proximity of the reef does this mad riot of color develop. Butterfly fish with bright yellow as a ground color, fantastically striped with blue and black, and bizarre rainbow fish, bearing streaks and patterns of every possible color, can be seen darting in and out amongst the coral branches. Crimson soldier fish, red, blue or green parrot fish, and blue surgeon fish abound in the deeper pools. This vivid coloration, contrasting with the surroundings, has been termed immunity coloration. The larger, predatory fish have found out that these brightly colored animals are immune from capture, and do not spend time and energy in fruitless pursuit of them.

PHOTOGRAPH AMERICAN MUSEUM OF NATURAL HISTORY

SEA LAMPREYS NESTING ON THE OCEAN FLOOR

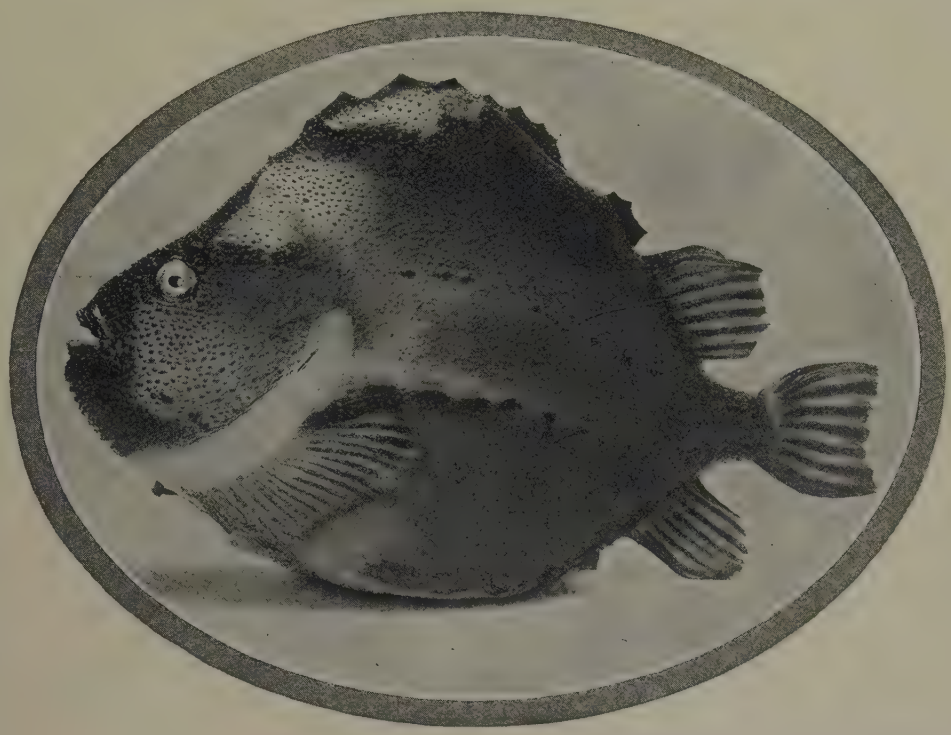
These are eel-shaped fish but differ widely from the eels. They have a circular sucking mouth and a tongue equipped with sharp, rasping teeth used to reach the blood of their prey.

Anger or fright are often as vividly pictured by the changing hue of a fish as by the facial expression of a human individual. The dorado, by sailors generally misnamed "dolphin," is worthy of special mention. The writer has many times noted this fish, five to six feet long, beautifully colored and exceedingly graceful, chasing flying fish, which seem to constitute its chief diet.

The archer fish inhabits salt and brackish waters

of South Asia and outlying islands of India and Polynesia. It reaches a length of ten inches and is silvery with black bands and yellow patches. It changes the color not only of its body proper but also of its fins. The temperature of the water, lack or abundance of food, clearness or cloudiness of atmosphere effect this change. This fish has a curious ability to swim backwards. Its eyes can be telescoped out of their sockets and moved in any direction but downward.

A few species, such as the kelp fish of the California coast and the stickleback, adopt during their mating season a vividly gay nuptial coloration. No doubt this makes them especially entrancing in the eyes of members of the opposite sex. The sand fish is, as far as I am aware, unique in the fact that it is the only fish that has blue eyes.



PHOTOGRAPH AMERICAN MUSEUM OF NATURAL HISTORY

THE STRANGE LUMPFISH

With its gelatinous flesh and thick, tough skin, this fish lives up to its name among denizens of the deep.

Various fish employ different methods in swimming. Genera of the more conventional forms use exclusively their muscular tail and the rear part of the body. Many of them can proceed through the water at a very great rate of speed. Fish with large heads and poorly developed tails, as, for instance, the angler fish, use their breast fins as paddles. The general form of the body and the way of locomotion make this fish a poor swimmer. Elongated fish move the entire body in an undulating way from side to side; the eel and the eel-like fish are thus very snake-like in their manner of progress. Flounders progress by an undulating up-and-down movement, and when swimming along a sandy bottom a flounder, through its step-like tracks, can often be traced to its hiding place, where

PHOTOGRAPH NEW YORK ZOOLOGICAL SOCIETY

THE ALBACORE, A LARGE ROAMING FISH

One of the favorite items of its menu are flying fish. This fish is not only predatory in pursuing and devouring smaller contemporaries, but it kills purely for the sport of it.

PHOTOGRAPH NEW YORK ZOOLOGICAL SOCIETY

WELL NAMED THE CHAMELEON OF THE SEA

The grouper who possesses the faculty of color changing to such a degree that it has been known to take on eight color phases in as many minutes.

it has covered itself with sand. The rays mainly consist of the big, fleshy breast fins, which fringe the margin of the body proper like wings with which the fish practically flies through the water.

Swimming, however, is not the only means of propulsion acquired by some fish. It has sometimes been a disputed question whether the flying fish flies or only volplanes through the air. On and off for a period of thirty years I have observed this interesting fish, and I have come to the conclusion that it does not actually fly, but merely uses its "wings" for soaring through the air. I estimate that a fairly long flight of a grown-up specimen is 300 feet in twenty seconds. It is noticeable that the flying fish is observed in greater numbers on a windy day than during calm, and that it is able to sustain itself in the air for a longer period when flying against the wind than at an angle or before the wind.

The gurnards are remarkable because some of them are counted amongst the flying fish. Others, living on the bottom close to the coast, have the front rays of their breast fins transformed into finger-like feelers. These are used as organs of touch to detect the presence of small animals on which the fish feeds.

The lump fish is very peculiar looking and fully lives up to its name. It has gelatinous flesh and a thick, tough skin. The ventral fins of this fish are united in a sucking disk, with which it anchors itself to rocks. The sucker fish has the forward fin on its back changed into a similar organ, which it uses to attach itself to ships, as well as turtles, sharks and other large animals, and, whilst able to swim on its own accord, in this way it secures free passage.

Fish derive their food from all available forms of animal and plant life; from an occasional mammal or bird down to the lowly plankton, minute organisms living suspended free in the water. Very few fish live on the higher marine plants. The menu of fish is to the greater part made up of aquatic members of the animal kingdom, such as other fish, mollusks, snails, worms, and jelly fish. Some, like the shark and the sargasso fish, do not spare even individuals of their own kind.

Many are scavengers, living on the dead bodies of animals and plants; others, as lampreys and slime eels, are semiparasitic. The majority of marine fish are predatory, pursuing and devouring smaller fish, and many of them, like the blue-fish and the albacore, are not satisfied with merely satiating their hunger, but kill purely for the sport of it. The large species feed on the smaller all the way down the line.

Plants, however, are primarily, directly or indirectly, the source of all animal food. Modern microscopic research has shown that unicellular plants and minute simple animals are so abundant and prolific in the seas that they amply meet all demands, and we need not fear famine for fishes.

Another Squirrel Friend

By A. DAWES DU BOIS

IN THE squirrel family there are not only the tree squirrels and chipmunks, but also the ground-squirrels which dig deep burrows in the earth. This latter group, more definitely known as the spermophiles, includes several different species. Most of these are prairie dwellers, but others are found only in the forests.

The Side-striped Ground-squirrel, or Rock Squirrel as it is called in some localities, is a resident of the open forests of the western mountain ranges—the Rockies, Cascades and Sierra Nevada. It prefers the open places in the forest, where rocks and stumps abound. Crevices of rock and slides are often chosen as places of refuge or abode. It is attracted also to the sites of old sawmills and abandoned mining camps. Geographically, it is distributed from British Columbia to New Mexico, and an isolated race is said to occupy a limited area in the high Sierra Madre of southern Chihuahua. It ranges from quite moderate elevations, in Oregon, to an altitude of 11,000 feet in some of the southern mountains. Though not a rare species, it is not anywhere very abundant.

Although the Rock Squirrel lives peaceably with the chipmunks, resembling them somewhat in habits as well as in appearance, it is not a chipmunk but a true ground-squirrel. The scientific name of the species is *Callospermophilus lateralis*. In different parts of its range it is represented by several races or sub-species. Among the local names given it are Calico Squirrel, Golden Chipmunk, Tiger Squirrel, Two-striped Chipmunk, and Say's Spermophile.

SIDE-STRIPED GROUND-SQUIRREL

For such a little fellow his Latin name of *Callospermophilus lateralis* seems almost too much.

This is the only true spermophile marked along each side with a single broad stripe of white, bordered above and below by black. The back is plain brown-gray. The head is a brighter brownish and is unstriped. The eye is almost completely encircled by a whitish ring. The animal is larger than the chipmunks and of rather stouter proportions.

The rock squirrels live in burrows, which they dig under logs, rocks or stumps. They also use the natural shelter of crevices in rock-slides. Students of their burrows find that they are sometimes provided with several entrances. The nests and storage chambers are off the main passageways. The nests are lined with leaves and other soft substances, including, in the sheep country, small tufts of wool.

These little fellows can be taken into one's confidence. The one pictured eating a cracker became exceedingly tame. It often came into our cabin for breakfast and even climbed up to our shoulders to secure choice bits of food.

THEY CAN BE TAKEN INTO ONE'S CONFIDENCE

This squirrel came in for breakfast and sought choice bits of food from diners' shoulders.

Their bright attractive markings and active habits make them interesting camp neighbors. They like to take prolonged sun-baths, lying stretched out at full length. The sunny days are also the periods of their greatest activity. A

gloomy outlook is apt to keep them "indoors." On the dark days and in stormy weather they spend much of their time in their burrows. They also retire early in the evening and do not reappear until the light is bright next morning.

In running, they hold the tail upright, giving them a sprightly appearance. Their "language" is doubtless very limited, but they have warning signals and social calls, in a sharp chirping voice. They chirp or squeak at any intruder while sitting upright to watch him.

Their food habits are omnivorous. They are fond of various seeds, small fruits, green leaves and flowers, tuberous roots, eggs and young birds, grasshoppers, beetles, and other insects, and are attracted by the camper's bread, prunes and bacon. When eating, they sit erect and hold the food in their forepaws, using them as though they were hands. They have capacious cheek pouches for transporting their food supplies and can carry an amazing number of seeds or kernels of cereals. I have seen them cache surplus food supplies in the sand and in the crevices of a loose rock wall.

As the time to hibernate approaches, the rock squirrels become fat and sluggish. They disappear in their burrows in September or October and are not again to be seen until Spring. Of those which we observed in northern Montana the first one came out on the sixteenth of April, but the tame one remained in the burrow until the twenty-fifth.

One litter of young each year, usually four, but sometimes as many as seven, make their appearance above ground at the beginning of summer. When half-grown they are very playful. They wrestle and romp together and chase each other as though playing a game of tag. I have seen one of them kiss his brother and then put his paw on the brother's nose. One observer mentions seeing a rock squirrel use her forefeet to push back her heedless youngsters, into crevices in a rock slide, when they persisted in coming out to look.

Like all other living creatures, the side-striped ground-squirrel has its share of natural enemies. Among them are coyotes, weasels, bobcats, foxes, badgers, skunks, snakes, and, of course, mankind.

Crows at Sunrise

OCTOBER has washed the air until it is transparent as crystal. At dawn the Cascades stand darkly against the sky, in perfect silhouette, though the peaks are far and far away. No alien dust, no lingering trace of smoke troubles the clearness of this visibility. And dark against the dawn the crows are flapping, for it is the time of their council—the restless, fretful, wise and wary crows of October, with every man's hand against them and a high confidence in their own discretion. What do they speak of, there in the oaks?

"WHAT DO THEY SPEAK OF, THERE IN THE OAKS?"

Very queer it is that October, with her garland of bright leaves, her bath of sunshine, should have a mood both gay and grave. This the crows know and understand as well as we, and it is of this that they talk, the black vagabonds—while the cottonwoods are smitten to silver by the early light, and the fog spirals twist above the broad river. For while their cawing is at times happy and even jovial, one catches now and then a poignant, grieving note, the threnody of summer. The crows know.

When the sun strikes that fellow, as he turns to avoid us, he is of black opal, blazing with strange fire. Each feather refracts the warm rays from his glossy surface, and we perceive that the jackanapes of the fields is beautiful in his way, which is Nature's way. A thief by choice, a vagrant by instinct, he is as much a part of the spell of October as the vine-maple, that tree in death as warm and colorful as wine. Moreover, he has the good sense to be sorry summer is gone, and that for a season there will be no young corn blithely aspiring.

Other birds fling themselves joyfully into the tide of migration along the blue air-lanes, with never a vain regret for the lands they leave. But the crow—well, the crow is somewhat like us. He comprehends the tragedy of October, as it bows to coming winter.

The Man-o'-War Birds

By STEPHEN C. BRUNER
Estación Experimental Agronómica, Cuba

(ILLUSTRATIONS BY THE AUTHOR)

THOSE who have been privileged to sail the tropical seas are no doubt familiar with a great slender bird with the long forked tail of a swallow, which, on motionless wings, floats in majestic circles through the cloudless sky with that perfect poise and grace peculiar to the limited number of creatures whom Nature seems to have perfected and so adapted to their environment that they appear as much a part of it as are the sunlight and blue waters themselves. Such is the Man-o'-War Bird (*Fregata magnificens*).

No one with the least sense of the artistic and beautiful could fail to be stirred with admiration at the sight of this master of flight, equaled by few birds and surpassed, perhaps, by none. Although probably not endowed with the endurance of the albatross, it is nevertheless often met with in the open sea far from land, and evidently distance is to it a matter of no great concern. A member of the Steganopodes—a group including the pelicans, cormorants, boobies, and tropic birds—the Man-o'-War Bird is so different in appearance from its cousins that their relationship would hardly be suspected unless by chance the small feet are examined, when it will be seen that all four toes are connected by webs, the chief character common to all.

In America it is found throughout the tropical and subtropical seas from Florida and southern California southward, but occasionally wanders much farther north during the summer. Except at the nesting grounds, however, it is nowhere seen in large numbers, although it is a familiar sight in the West Indies and at many points along the Central and South American seaboard.

The Man-o'-War Bird measures about forty inches in length. The adult male is dull black, rather glossy above, with a large bare orange-red or carmine throat-pouch, which is inflated at will to an enormous size during the mating season. The female is somewhat browner in color and has a white breast, while the fully feathered immature birds are more strikingly marked with the head and neck entirely white. The long, powerful-looking beak is nearly straight and is strongly hooked at the end. The large swallow tail, which adds so much to the beauty of the bird, is usually closed or partly closed during flight, but may be opened at intervals, especially when making turns and in alighting. The wings are long and slender and are carried only partly extended, giving the birds a peculiar angular appearance that has called to mind pictures of certain prehistoric flying reptiles. Oddly enough, this resemblance only occurred to me while at their nesting grounds on a lonely islet far from the haunts of man and other terrestrial creatures. Here the great silent birds, floating back and forth overhead, gave the uncanny impression of beings of a past age, although in reality they are most admirably fitted to the present.

FUZZY WHITE AND ABSURD

A nestling equipped with wings that seem heavy and burdensome for one so young.

The food of the Man-o'-War Bird consists principally of fish and other animal matter which it is able to obtain from the surface of the water. It is well known, however, that at times it has the evil habit of chasing other birds, such as cormorants, gulls, terns, and boobies, when they are returning from fishing expeditions, and forcing them to disgorge their catch, which is promptly appropriated.

The Man-o'-War Birds frequenting the coasts of Cuba and nearby islands seem to nest largely on a small mangrove key situated near the south shore of Siguanea Bay, Isle of Pines. This key, consisting of only an acre or two of more or less swampy land, is known by the name of Crocodile Key, due evidently to the fact that it is very popular among these reptiles, which take an active interest in the young birds that put to sea at a too tender age.

With a keen desire to explore the mysteries of this Man-o'-War Bird stronghold, and accompanied by several equally curious friends, I set sail one March morning from the west coast of the Isle of

Pines. The south shore with its numerous outlying keys could soon be distinguished across the shallow bay, some ten miles away. After an hour or so great numbers of minute, moving specks could be made out in the sky above a streak of green on the horizon. It was Crocodile Key!

SHE EYED THE BRIGHT LENS WITH SUSPICION

Mother bird surveyed the camera and then moved over a bit, exposing a lone egg, resting somewhat precariously on her nest.

Steering straight for the islet, we were soon as near as we dared approach, because of the shallow water which surrounds it. Casting anchor, we took to the small boat to go ashore. As we drew nearer I observed a new and strange phenomenon: the mangroves, it seemed, were bearing a profusion of enormous, brilliant red fruit. A few yards more and the fruit was seen to be a part of the birds themselves, half hidden in the green foliage. The discovery was followed by the immediate disappearance of this remarkable display, as, with the roar of a thousand wings, the Man-o'-War Birds took to the air, flying back and forth with appearance of great concern. We pushed our way through the overhanging mangroves and made a landing by swinging ourselves up through the maze of aerial roots. The trees were exceptionally large and the nests were placed some twenty feet above the ground. With some little effort I was able to reach the first branches with my camera, and from there easily made my way upward. The tree selected was full of nests placed only a few feet apart. As I ascended I encountered a brooding female directly in my path and could not proceed without climbing over her, as the nest was placed against the trunk of the tree. As I peered through the branches I could see her watching me attentively, her formidable beak apparently ready for action. I reached up cautiously and shook the nest—no result. I then pulled her tail; still she did not stir. Becoming reckless, I caught her by one wing and pulled her half off. This kind of familiarity was more than her equilibrium could stand, and with a single beat of her great wings she was away on the breeze.

I then worked up to the top of the tallest branch of the tree, from where I could look out over the rookery and work my camera satisfactorily. I was in plain view from all sides,

A MASTER OF FLIGHT, EQUALED BY FEW

The man-o'-war bird floats in majestic circles, a part of its surroundings of tropical seas, yet giving the impression of belonging to a past age.

however, and a number of the birds took wing, but soon settled down again. A very fuzzy, white, and must absurd half-grown nestling pulled at my coat viciously from the small loose platform of sticks that served him as a home. I thought at first that he was angry and was thus demonstrating his non-conformity with my presence, but soon realized that the little fellow was only asking for food. I gave him my finger, which he nibbled gently and tried to arrange in a suitable position for swallowing, looking at me all the while with a most quizzical expression in his mild black eyes.

LONG FORKED TAIL AND SPREADING WINGS

A relative of many tropic birds in fact but not appearance.

On the other side a Mrs. Man-o'-War was at home within arm's length. As I began focusing my Graflex on her she eyed the bright lens with suspicion and moved over a bit, exposing her nest and only egg, so I photographed them all together. In the meantime a very somber masculine representative of the tribe had alighted a few feet away, and in a most unconcerned way was now gravely engaged in inflating his brilliant red throat-pouch. This recalled to mind the operation performed by a child in blowing up a large toy balloon. After several minutes of this sport the gentleman suddenly deflated, and departed with the lively breeze which was now blowing. Although these great sea-birds are usually silent, they were occasionally heard to emit a very low, croaking note when hovering near. At times the birds circling high above the rookery would also call shrilly in a short, rapid series of peculiar, penetrating notes, somewhat like those of certain hawks.

LIKE COMICAL LITTLE PENGUINS

Black feathers develop on back and shoulders as the youngsters grow older.

The Man-o'-War Bird usually lays only one egg, of a dull, greenish, chalky-white color, somewhat larger than that of a turkey, broadly oval in outline, and very thin-shelled and fragile. Although both parents are known to take part in brooding, the birds on duty at the time were all females. Could it be that the only deserted nests were those attended by the "head of the family" in each case, at the moment of our arrival?

The newly hatched nestlings are pitiful, naked, helpless little beings, resembling very young pigeons, as there is no indication of the long beak. A thick growth of white down is soon acquired, however, the beak lengthens, and they become strong enough to take some notice of the world, although the wings seem heavy and burdensome. As the youngsters increase in size the back and shoulders develop black feathers — the interscapularies—which contrast oddly with the pure white down covering the rest of the body.

At this period they are lively, interesting little fellows, and are able to sit up straight like comical little penguins. This plumage is followed by that in which the head and lower parts of the body are

white and the remainder mostly brownish black, at which stage they leave the nests. The food of the young consists of small fish which are obtained from their parents' throats by thrusting their heads inside. This phase of the family duties was not observed at Crocodile Key, as our visit was made at the mid-day siesta period, meals being served during the morning and afternoon hours.

The young birds have their troubles. It is well known that imprudent or unfortunate nestlings not infrequently fall from the small, frail platforms built by well-meaning but inexpert parents. Those which reach the water are probably all well received by the patient crocodiles, while others, in attempting to save themselves, are caught by their necks in the forks of the branches and strangled to death. The birds which have thus prematurely ended their career have been seen with such frequency by those few who are acquainted with Crocodile Key that they have come to refer to them as "hang birds."

Apparently family duties may demand the attention of the Man-o'-War Bird during almost any season of the year, but early spring is evidently the busiest period. At Crocodile Key eggs and young of all ages have been found in March and April, while as late as October some nests are still inhabited, although the nestlings are now nearly fully grown. Thus it would appear that late fall and early winter is the only period available for a general vacation.

On the opposite side of the islet from the Man-o'-War Bird colony a few White Ibises and cormorants were seen, which are supposed to nest there. None, however, had attempted housekeeping near the Man-o'-War Birds, which may be explained, perhaps, by the rather piratical attitude of the latter towards their less powerful neighbors. On the other hand, I know of no bird or beast that dares to interfere in the affairs of the Man-o'-War Bird, except man, of course, who interferes with everything. In this respect he probably does so now out of curiosity only, or perhaps occasionally to test his marksmanship, but it is recorded that formerly the negro inhabitants of some of the Bahamas, who are not fastidious as regards matters of diet, utilized certain rookeries as the source of a meat supply as long as they lasted.

It may be concluded that the Man-o'-War Bird, considering his habits, is neither directly injurious nor beneficial to mankind—that is, from the cold, economical point of view. However, nothing could be without value that so stirs the "inner self" of one as does the inspiring sight of this superb creature as it soars with such indescribable grace in the sky.

The Kangaroo

By KILROY HARRIS

THE NATIONAL ANIMAL OF AUSTRALIA

The kangaroo is an animal of inconsistencies. It jumps when it runs, stands when it sits down.

THE Australian Kangaroo is one of the few animals that jumps when it runs and stands up when it sits down. It boxes with its paws, it rips its enemy open with the strong claws on his hind feet, and it fights also with its tail. Australians make soup out of the kangaroo's tail. The mother carries the little baby kangaroo about in a pouch, or "vest pocket," as one little girl expressed it. Excellent leather is made from the kangaroo's hide.

The kangaroo is the national animal of Australia and therefore figures in the Australian coat of arms. It is to be found on all present-day stamps of the island-continent, supporting King George's head on one side, while the national bird, the Emu, supports the other side.

Museum Magic

By HELEN VONKOLNITZ HYER

THREE wolves had emerged from the shelter of a growth of conifers on the crest of a snow-covered hill. Their gaze was fixed upon the valley below where dark forms of deer stood, outlined by the soft moonlight against the white snow. Beyond stretched a vast expanse of wooded snow-covered hills, and far in the distance shone the frozen surface of a forest-rimmed lake. There was a sinister stillness in the whole scene, the wolves tense and stealthy, lurking tragedy in their very posture.

The wolves did not stir. The deer stood transfixed and the moon did not move in its course. Why should they? They were but museum magic. The snow in the foreground on the sloping hill was cotton sprayed with paraffin. The trees to the left were hollow forms encased with true bark and supporting branches of evergreen that had been cured and varnished into permanency. The artist's brush had conjured with perspective, grown a tamarack swamp, from which the deer had emerged, and given sheen to the distant lake.

NOT AS DANGEROUS AS IT LOOKS

There is no need to cry out in warning; Mr. R. Bruce Horsfall is merely painting the background for a bear group at Kent Museum.

Behind glass was preserved a story of Nature. The research and study of the naturalist, plus the art of the naturalist-taxidermist, plus the skill of the brush of the naturalist-artist, had performed a piece of museum magic. Together in this group—a new one at the Kent Scientific Museum of Grand Rapids, Michigan,—as in other groups found in most of our leading museums, they had constructed a moment in the life of the wild.

Speedily the American people are becoming consciously aware of an interest in the facts of Nature. It is a study that is finding its rightful place in the schools. It is being recognized as a fundamental in education. Many steps are being taken to meet this demand for Nature educational facilities. Not the least important is the habitat group. Providing at a glance the important details of the environment, habits and life history of a species, these groups impress even the most casual wanderer through a museum. More important than that, they serve as a vivid illustration to texts of science and Nature study.

Great progress has been made in the fashioning of habitat groups. Where possible, lighting is made better. The old type of stuffed subjects hitched to a varnished board has given way to bits of the outdoors brought in or imitated with consummate skill. Back of each group is a study of conditions as they exist in the section from which the subject is taken, and these conditions are reconstructed faithfully and artistically. The habitat groups of today, as they are found in such museums as the American Museum of Natural History, the Museum of the California Academy of Sciences, the Milwaukee Public Museum, the Field Museum of Natural History and others, are of this valuable educational character.

Photographs used to illustrate this article are from some of these museums, and others will be published from time to time. The wolf habitat group is one of two new ones at the Kent Museum, being the combined work of Edward Allen Hyer of the museum staff, as taxidermist, and Mr. Robert Bruce Horsfall, Art Director of NATURE MAGAZINE, under the supervision of Henry L. Ward, Director of the Museum. The other group is a bear group, which Mr. Horsfall is shown painting, apparently in dire danger of his life.

In the black bear group one meets with a touch

THREE WOLVES HAD EMERGED FROM A GROUP OF CONIFERS

A wintry habitat group at the Kent Scientific Museum. The background was painted by Mr. Horsfall and one is needful of keen eyes to detect where the painting meets with the foreground.

A GROUP OF THE RED MONKEYS OF ABYSSINIA

This is one of the pieces of museum magic performed at the American Museum of Natural History in New York. It tells a story few can see in person in real life.

MEETING A HAPPY FAMILY OF VIRGINIA DEER

Father, mother and fawn live in appearance if not in fact in this group, which is to be found at the Field Museum of Natural History in Chicago.

A PUMA MOTHER FORAGES FOR HER YOUNG

Another group of the American Museum of Natural History, taking the visitor into the very heart of a puma home and telling a striking story of Nature in the wild.

of forest comedy. Mother bear welcomes no advice or assistance from father bear when her cubs are young; but he, at times, does not realize that his room is more desirable than his company. In the group, father bear, peacefully foraging for food in the woods, blunders upon his mate and cubs who are rooting for ants in a log. Suddenly he rears up on his hind legs to peer above the top of a small hillock which obstructs his view. The group portrays the moment when mother bear senses his intrusion, looks up, and snarls her disapproval that he should so blunder in where he is not needed or wanted. One little frightened cub scrambles up the nearest tree while the other pauses at the foot of the tree and regards the newcomer with a most expressive amazement and reproach.

A THANKSGIVING HABITAT GROUP

Rare in wild life today, these wild turkeys are safely behind glass at the Field Museum of Natural History in Chicago.

The bears stand in a typical bit of northern Michigan woods near the banks of a river, which is seen in the background. The slightly rolling country, the tangled thickets of fallen logs, the ferns, violets, trilliums and other plants of the locality are naturalistically reproduced in wax in the foreground and realistically blended with the painted background.

Material for these and other projected groups were obtained on an expedition to the northern peninsula of Michigan. The specimens and other necessary materials were gathered after interesting adventures and hard work. Once accomplished and safely housed at the museum, the real task began, and here, in brief, is the story of a habitat group.

A small sketch model of the bear group was planned with miniature figures of the bears to determine their positions in the completed group. Next the life-size figures were modeled in clay from accurate measurements of the animals taken in the field, and these forms later transferred through the medium of plaster molds into thin, durable mannikins of papier mache and wire, which, reinforced with iron rods, made up the forms over which the skin was applied. With glass eyes and retouched complexions the bears were soon quite their natural selves again and waited patiently until the wax leaves and flowers were ready to convert the mere plaster base of the group into a bit of northern woods where giant-like trilliums shared honors with maidenhair ferns, violets, jack-in-the-pulpits, Solomon's seals, and many other varieties springing from the thick coating of last year's leaves to bring summer once more in the forest. The same process was repeated with the wolves; only here the varied plants of the summer woods gave way perforce to snow-laden conifers, for museum magic knows all seasons.

The December issue of NATURE MAGAZINE will be a fitting number in charm and contents with which to close the year and make way for a new year. William L. and Irene Finley have written an entertaining story of the Moose, which will be illustrated by a color insert from R. Bruce Horsfall's brush. From the pen of Ben Hur Lampman comes a tale that tells the story of the Turkey as none has told it before. Arthur Newton Pack takes the reader through the southwestern desert. Paul Griswold Howes takes him in quest of the Howling Monkey. Albert Payson Terhune writes of the Police Dog. Truly a remarkable number.

An Outline of Unnatural History

By DAN McCOWAN

(ILLUSTRATED FROM PHOTOGRAPHIC STUDIES BY THE AUTHOR)

OF THE making of books pertaining to wild life there is no end. On all the continents, and even on the most remote and insignificant islets of the seas, naturalists probe and pry into the manners and habits of mammals, of birds and of minute insects. Today we read of an expedition setting forth into Siberia to inquire diligently and thoroughly into the life histories of recently discovered rodents. Tomorrow, a party of learned scientists depart for the Galapagos, to study at first hand the behavior of giant tortoises, reptiles which have been known to civilized man for many generations. A host of writers, endowing furred and feathered folks with human attributes, contrive to spin upon imagination's wheel varicolored threads of romance, of adventure, of love and hate and strife. These, cleverly interwoven with the drab warp and woof of more prosaic fact, serve to brighten the fabric of modern monograph on bird or beast.

This up-to-date method of luring the reader into bypaths of nature study has much to commend it. Unfortunately, and in a great number of cases, liberty has degenerated into license, with the result that on newsstand and on library shelf gross error jostles wholesome fact in somewhat ruthless fashion. Surveying the vast accumulation of unnatural history that is current in this super-enlightened age, one is led to speculate anew as to the hooting of owls, the laughter of loons, or the twinkle of stars in the evening sky. Truly there are more quaint things in Nature's realm than Mother Nature ever dreamed.

THE GRIZZLY BEAR

He is credited with a love for ants and the ability to suck up whole colonies with his nose.

In days of old the ancients had a great store of legend and tradition pertaining to animals and birds. Much of this Nature lore, transmitted verbally by one generation to another, became embellished by time. Thus it was that creatures of the woods and hills were often credited with a strength and an ability far exceeding their physical and mental capacities. With the spread of education among all classes of people, with the advent of the printing press and the photographic camera, with the ever-

THE BIG HORN SHEEP

They are falsely accused of being "bounders," descending from heights on gravity and with reliance on Providence.

increasing facilities and opportunities for study in the University of All Outdoors, it might reasonably be supposed that a mass of wild life error and superstition would be forever swept away. Far from it, for today there is a greater tendency towards what has been so aptly termed "Nature Faking" than ever before. It is interesting to note that classical myth and legend, especially that which centered on birds and beasts, carried a wealth of detail, the several creatures being described in most minute fashion. Too, there was in past times an effort made by historians to link cause and effect and a striving for logical reasoning. In comparison, the myths of many modern Nature writers seem raw, crude, and utterly devoid of regard for truth or reason. Occasionally, however, one discovers an example that is ingenious and has the merit of being at least based on fact.

In former ages there were many quaint and curious beliefs regarding birds and beasts. Salamanders, a tribe of amphibians which are still to be found on this continent, were for long thought to live in fires. From this circumstance we have in our vocabulary the word "salamander," a brazier or basket for holding a fire of glowing coals. Dragon flies were held in ill-repute for many scores of years because of the belief that, given opportunity, they would sew up the ears of infants. Where this belief is still prevalent, the insects are spoken of as "Darning Needles." Earwigs were likewise dreaded, they being said to enter the brain of man by way of the ear. Shrews were regarded as malignant and evil creatures, particularly by vintners and innkeepers. The tiny mouse-like beasts emit a pungent musky odor, and it was supposed that, should one of them gain entrance to a wine cellar and run amongst the bottles, the wine contained therein would be entirely spoiled. In White's "Selborne" another peculiar tradition regarding the shrew is to be found. "For it is supposed that a shrew mouse is of so baneful and deleterious a nature that whenever it creeps over a beast, be it a horse, cow or sheep, the suffering animal is afflicted with cruel anguish and threatened with the loss of the use of the limb." The cure for this ailment was to apply twigs or branches from the "Shrew Ash," a tree whose trunk had been bored into with an auger and in which cavity a live shrew had been imprisoned. Such trees were held in extreme veneration throughout the length and breadth of medieval England.

WHITE PELICAN, BIRD OF ANCIENT LINEAGE

One of its old-world relatives was supposed by the ancients to nourish its young with its own life blood.

The White Pelican is a bird of ancient lineage, being one of the oldest forms of avian life. It is not surprising, therefore, that there should be abundant lore and fable interwoven with the true life history of the species. Young pelicans, in the early stages of their existence, live chiefly upon predigested fish regurgitated by the parent bird. Into the pouch and often apparently far down the gullet of the mother bird the ravenous youngsters probe for food, scrambling in unseemly haste, fearful lest there should be no choice morsel left. Noting the manner in which these young birds were fed, men of olden times concluded that the pelican nourished her young with her own life blood, a suggestion which persists to this day. The State of Louisiana upholds this bird as an outstanding example of parental affection, the Great Seal of the state bearing a representation of the pelican feeding her young, presumably in accordance with ancient tradition. There is likewise engraved on the seal of an American life insurance company the picture of a pelican with her ungainly brood. The accompanying motto, "I live and die for those I love," seems indeed a curious survival of a long exploded myth concerning one of our most interesting North American birds.

According to classical writers, the Kingfisher or Halcyon was, of all birds, most favored by the heavenly powers. During the season when these birds were engaged in hatching their eggs, it was popularly supposed that upon the surface of the seas, where the nests were said to float, a profound calm

prevailed. These were the Halcyon Days. In the chimney corner of many a rural English dwelling a dead Kingfisher dangled by the bill from an oaken rafter overhead. It was believed that the bird, suspended in this manner, would always turn its breast in the direction whence the wind was blowing.

A great deal of misty superstition has in all ages surrounded the members of the toad group. For long supposed to be saturated with a particularly deadly venom, the unfortunate fellows were not only shunned but also put to death whenever opportunity occurred. The story of the toad, "Ugly and venomous, yet wearing a precious jewel in his head," although entirely fabulous, has a curious origin. Five hundred years ago there were "quack" doctors, nostrum

PORKY—THE SUBJECT OF A PERSISTENT MYTH

The story that the porcupine "shoots his quills" apparently will not down. He is still credited with a championship at archery.

MANY MYTHS HAVE BEEN WOVEN ABOUT THE RAVEN

The bird is believed by some to possess a keen sense of smell, particularly of gunpowder and carrion. It is keen vision, not smell, that accounts for its activities.

vendors and floods of what we now call "patent medicines." At that time a favorite treatment for mad-dog bite consisted in the rubbing of the bitten parts with a magical stone taken from certain animals, such process being thought to draw poison from the wound. For such purposes a stone extracted from the head of a toad was considered to be particularly effective and, naturally, commanded a high price. The proverbial "hair of the dog that bit him" would have proved equally virtuous. Tales of toads being found embedded in solid rock are fairly common even to this day. None of such happenings will bear close and careful investigation. Undoubtedly these creatures are capable of living for a long time without partaking of food, but recent experiments have proved that imprisonment in a block of stone will prove fatal to a toad in less than two years.

In the wide range of literature relating to birds there are many pages devoted to the somber plumaged raven. Primitive man considered this "Vulture of the North" a bird of evil omen and believed that it possessed abnormal intelligence. In the Koran it is recorded that the raven taught Cain how to dispose of his brother's corpse by killing a bird and then burying it before his eyes. In Scandinavian mythology two great ravens, Memory and Thought, sat on the shoulders of Odin and were employed as messengers, bringing news to the god from the utmost ends of the earth. Throughout North America, where ravens are still present in considerable numbers, there is yet a prevalent belief that the birds are endowed with an extraordinary sense of smell. An early explorer, traversing the Barren Lands of Canada, wrote, "An unarmed man may approach very near to the ravens when they are feeding, but they are shy of those that have a gun: a great proof that they smell the gunpowder." From the well-known fact that ravens discover the carcass of a dead animal with a promptitude that seems uncanny, it is popularly supposed that ability to smell carrion at a great distance draws the birds from all parts of the compass and from over an extensive area. It is keen vision rather than smell that is primarily responsible for the sable-coated scavengers assembling in large numbers wherever there are bones to be picked.

THE AMERICAN BELTED KINGFISHER

An old-world relative is responsible for the term "Halcyon Days," about which there is entertaining myth.

There is, as might be expected, much lore of the honeybee. Virgil asserted that echoes were injurious to these industrious workers. In some parts of Europe it is customary to tap at intervals upon the bee hives, using the house key for this purpose, and then, having presumably secured the attention of the bees, to tell them about the doings of the owner's family. In the "Poor Man's Physician," a book published in Edinburgh two hundred years ago, it is stated that "the ashes of burnt bees mixed with oil and applied as an ointment is a most excellent cure for baldness." From which possibly comes the auld Scotch saying of "A Bee in his Bonnet."

Weird and wonderful as were many of these old-time fables, their luster is dimmed and their brilliancy is eclipsed by modern and shining examples. These latter-day tales, woven around the lives of many notable birds and animals, are, as a rule, and despite their glaring inaccuracies, delightfully naive and altogether refreshing in their simplicity. For instance, there may be cited the often recurring narrative which describes how the "Big Horn" sheep of the Rocky Mountains habitually descend from the lofty and precipitous cliffs of their habitat by relying on gravitation and on Providence. Scanning a book written by an English sportsman who had hunted big game in the "Colonies," we read:

"These wild sheep habitually leap downwards from the highest rocks and crags and, alighting on their massive horns, suffer no shock or injury whatever." A simple, direct story, clear and concise, not cluttered by confusing and tiresome explanation.

Even the small mammals, shunning publicity and desiring only to be allowed to live peaceably, have been subjected to much pen and ink abuse. There

are a number of species of mole found in North America, quiet, obscure creatures, living almost perpetually underground and, strange to say, coming out to open air and starlight when their days are nearly ended and the last sleep time draws near. Indeed, outside of trappers and ploughmen, but few persons ever see one of these dusky coated animals alive. Yet on the authority of a high school textbook on natural history we are assured that "moles have a habit of coming to the surface of the earth precisely at noon each day." No explanation is offered as to this extraordinary happening. No hint given as to how these living chronometers, living below the surface of the earth, measure faithfully the passing hours and come to greet the sun at meridian.

The great "beaver tail myth" is still at large and as active as ever, telling that the plastering operations of this animal are performed with his paddle-like tail. Occasionally one finds a variation in the fable which, though equally untrue, has at least the merit of being novel and original. Only the other day we were assured by an earnest Nature student that the tail of the beaver is frequently used as a sled, mud, clay and stones being transported on it to the dams and dwellings of the beaver colony. From another source comes the misinformation that this versatile four-footed engineer, when dining, sits upon the floor of his moated house and, bringing his broad flat tail forward between his legs, uses it as a platter.

Within the covers of a well-known magazine there appeared quite recently a new and revised version of the hoary legend about the porcupine "shooting his quills." From this account it would appear that "Porky's" deadly archery need no longer be dreaded, for at least one of his many enemies has reasoned out and perfected a system of defense whereby the whizzing darts may be successfully evaded. In brief the story was as follows: "The Fisher, a species of weasel, has been seen to creep underneath the snow and with his sharp teeth grip a porcupine by the throat. The latter then shoots with his quills in vain as the fisher is effectually shielded and protected by the snow."

Some of our largest and most dignified mammals have been subjected to ridiculous misrepresentation. Thus the mountain lion has been accused of carrying a concealed weapon in the shape of a sharp spike on the tip of the tail, using it to inflict wounds upon various parts of his own anatomy and goad himself into a fury. The far-famed grizzly bear of the Rockies must, according to one writer, be part bear and part vacuum cleaner. This observer affirms that the bear, being inordinately fond of ants, inserts his nose into the largest ant-hill he can find and then, with a mightly indrawn breath, inhales the entire colony of insects.

For the schoolboy who said that a myth is a female moth we have admiration unbounded. The juvenile entomologist who, keenly interested in moths and fired with a beginner's enthusiasm, was so far led astray by the vague phonetics of the English language as to purchase a book entitled "Advice to a Young Mother," has our special sympathy.

Residing, more or less, permanently upon the hillside of Nature knowledge, far above the mists and fogs of wild-life error and superstition, we take delight in basking in the mellow sunshine of uncontroverted fact. But we still buy "camel hair" brushes that are made from squirrel tails; we associate the garrulous magpie with the forthcoming vital statistics of the neighborhood; tenderly we escort spindle-legged spiders from our dwellings. At certain seasons of the year we perform a solemn rite over the collarbones of a goose or turkey; we set aside one day in our yearly calendar in honor of the weather-wise groundhog. Relying on rabbit's foot or on tooth of elk, believing in a clover stem that bears an extra leaf, jingling pennies as the slender crescent moon is seen, we watch eagerly for the coming of that fabled "ship" which, bearing our treasure in her spacious hold, has for so long been buffeted by adverse winds and hindered by contrary tides that we fear lest the crew have slain an albatross. Failing this, we place the responsibility for the vexatious delay upon our neighbor's cat, for frequently it crosses our path. Its lives may number three times three. Who knows?

Many photographs have been received for the December Amateur Nature Photographer's Contest which closed October 15.

Photographs for the January contest, accompanied by a stamped, self-addressed envelope or container, should be mailed to reach this office before November 15. A year's membership in the American Nature Association will be awarded to the entrant submitting the best photograph from the points of view of both Nature photography and human interest. This may be used by the successful contestant or for a gift. Other outstanding photographs will be published with credit to their authors.

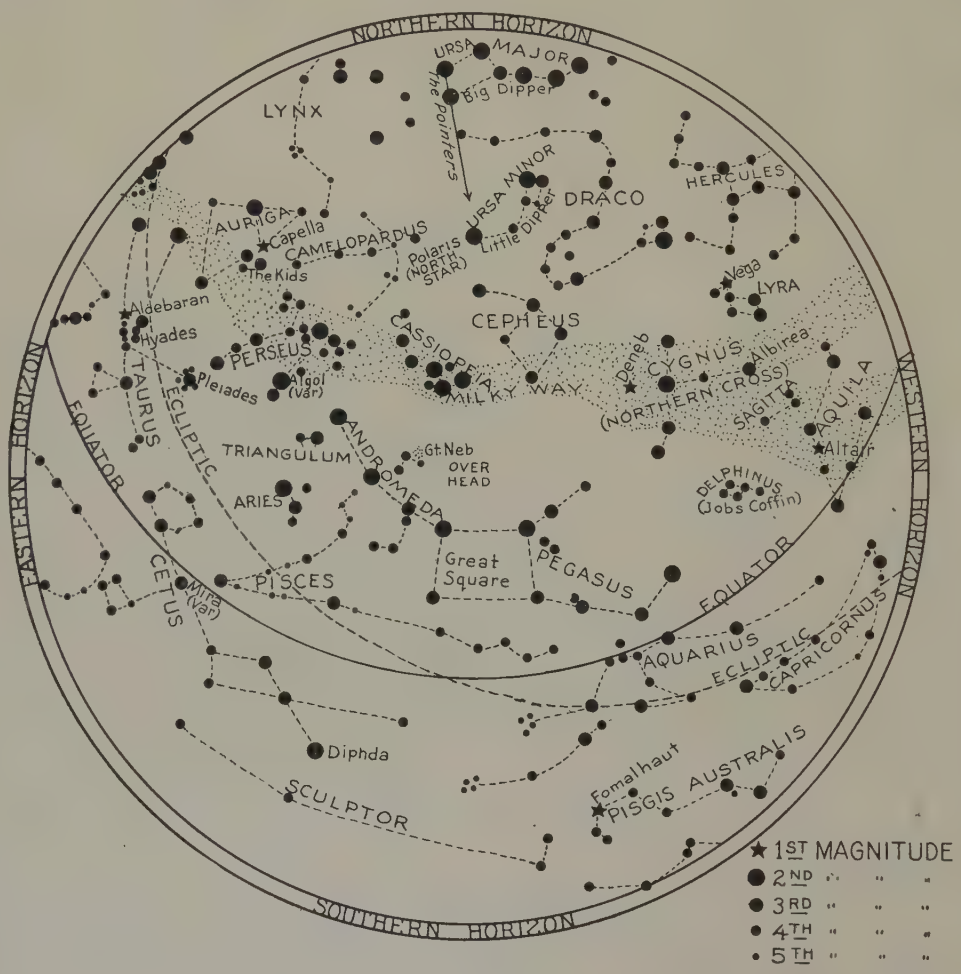
Send your photographs for the January contest to: Photograph Editor, NATURE MAGAZINE, 1214 Sixteenth Street, N.W., Washington, D. C.

Meteors in the November Skies

By ISABEL M. LEWIS

STAR-GAZERS who keep a close watch on the heavens this month should be rewarded with a fine display of meteors about the middle of the month when the Leonids are due to arrive, and again about the twenty-fourth when the Andromedes should appear.

To see the Leonids one must be up early in the morning before sunrise and look in the direction of The Sickle in the constellation of Leo, where the "radiant" of the swarm is located. That is the point from which they appear to radiate in all directions. As a fact, the meteors are moving along in their orbits in nearly parallel lines, and their appearance of radiating from one point in the heavens is simply the effect of perspective, the radiant being the "vanishing point" in the scene. The meteors are usually named for the constellation in which their radiant is located, as the Perseids and the Orionids. The Leonids are very swiftly moving and they give forth an intense bluish or greenish light and leave brilliant, persistent trails. Their flight is rapid because they are met by the earth "head on," the morning side of the earth being the forward or advancing side in its orbit and the evening side the following side.



To use this map, hold over the head with top toward the north.

Meteors met in the evening hours move much more slowly with respect to the observer than the meteors that are met in the early morning hours, just as the relative motion of two trains that pass each other moving in opposite directions is far greater than when one train overtakes and passes another. The evening meteors have to overtake the earth, and so the Andromedes that are met in the evening hours are very sluggish in their motion. They should be seen about the twenty-fourth of the month. The exact time cannot be given because swarms of meteors are subject to disturbances from other members of the solar system. This may upset their schedules by a number of hours or even several days.

The Andromedes, as their name shows, come from the direction of the constellation of Andromeda. This constellation will be found a little to the east of the meridian about seven o'clock in the evening the last of November. One should look for the Andromedes soon after it becomes dark for a few days around the twenty-fourth of this month. In addition to being sluggish in their motion the Andromedes are reddish in color and leave short, rather faint trails of light behind them. The presence of bright moonlight, of course, interferes with the observation of meteors. They are seen at their best on clear dark nights when there is no moon. Meteors are continually entering the earth's atmosphere at all times, and with close watching one may

see several on almost any clear dark night. It is only when the earth encounters swarms of these particles moving in well-defined orbits that they appear in unusual numbers.

Meteors or "shooting stars," so called, are mere particles of cosmic dust, weighing at the most only a few grains. They become heated to incandescence as a result of the friction produced by their passage through the earth's atmosphere. They are different, it is generally believed, in their origin from the large and noisy fire-balls, bolides and meteorites that enter the earth's atmosphere with a blinding flare of light, also a result of friction with the atmosphere, and with loud reports like the rattling of artillery or the crash of thunder. Meteorites are large enough to escape being entirely consumed by friction. In some instances they strike the surface of the earth after being observed in their flight over an area of thousands of square miles. Many of these meteorites have been recovered and may be seen in our museums; a few of them weighing a number of tons.

Meteors that appear in periodic swarms, however, always pass through the air silently and are entirely consumed by friction, their ashes settling noiselessly to the earth. They are known to be the remnants of comets that have become disintegrated by the action of the sun or the planets. The pressure of sunlight and probably electrical repulsion also drives off many minute particles of matter from the head of a comet which go to form the tail. Particles driven off from the head of a comet in this way never return. When the comet makes many trips to the vicinity of the sun, as is the case with a number of small comets, they are gradually worn out and the debris is distributed more or less uniformly along the comet's path. Again a comet may come too close to one of the planets and be disrupted under the force of its attraction for the loosely bound particles of which the comet is composed.

The Andromedes, for example, are believed to be the disintegrated remains of Biela's comet which became disrupted as a result of a too close approach to our own planet. For some time in the earlier part of the nineteenth century this comet had been passing very close to the earth, at times within a few thousand miles of its surface. At the comet's appearance in the year 1846 it was seen to divide into two comets which continued to travel along side by side—for some years evidently—for they were seen again at the next return of the comet in 1852. This was their last appearance, although they were due to return every six and a half years, which was the period of the comet's revolution around the sun. In November, 1872, when the earth was passing close to the orbit of Biela's comet, it encountered a magnificent display of meteors which were believed to be the remains of the twin comets. Similar displays occurred again in 1885 and 1892, and now more or less dense swarms of meteors are observed every year at the point where the earth's orbit intersects that of Biela's comet, though exceptionally large displays are seen every thirteen years. It is for this reason that the Andromedes are also known as the Bielids.

In some cases swarms of meteors and comets are found traveling in the same orbit. This is true of the Leonids, which are moving in the same orbit as Tempel's comet of 1866. The Leonids, also, are bunched more thickly in some parts of their orbit than others, for unusually fine showers of Leonids occur every thirty-three years. Such displays were observed in 1833 and 1866 and again from 1898 to 1901. The greatest of these occurred in 1833, when it was estimated that on the early morning of November 12, during a period of several hours, about 250,000 fell at Boston alone, as silently and as thickly as snowflakes.

Let us now glance at the heavens in November. The region overhead and to the south of the zenith is a rather barren one on November evenings. The Great Square in Pegasus lies directly on the meridian at this time, and Andromeda lies directly to the east of Pegasus, the star Alpha in Andromeda lying in the northeast corner of the Great Square. These two constellations, together, cover a large area in the sky, but they contain no stars brighter than the second magnitude. Triangulum and Aries, Pisces, The Fishes, and Cetus, The Whale, which cover a large space to the east and southeast of Andromeda and Pegasus, also contain no stars brighter than the second magnitude. Diphda, a second magnitude star which stands in a solitary position in the southeast, is the only bright star in this part of the heavens. Pisces, which is one of the zodiacal groups, is a large constellation but is composed of faint stars only. In Cetus is Mira, The Wonder Star, recently found to be the second largest star in the heavens with a diameter of about 260,000,000 miles; but Mira is a very erratic variable star that goes through its light changes in an eleven-month period, and during all but a few weeks of this period it is a telescopic star only. It attains to the brightness of a third, or occasionally second, magnitude star only for a week or ten days during its entire eleven-month period.

Though there is such a dearth of bright stars overhead and in the southeast, the brilliant winter groups are now appearing in the east and northeast. The Pleiades and Hyades in Taurus and the bright, red Aldebaran are already well above the eastern horizon, and soon the Belt of Orion, fiery Betelgeuse and diamond-like Rigel will be clearly in view. Capella, in Auriga, is now high in the northeastern

sky, and on the meridian north of the zenith we see the royal pair, Cepheus, The King, and Cassiopeia, The Queen, the latter bound to a chair and compelled, as a punishment for her vanity, to circle ceaselessly around the north pole of the heavens.

The Northern Cross, in Cygnus, and the brilliant Vega, in Lyra, to the west of it, with the first magnitude star, Altair, in the constellation of Aquila, The Eagle, to the south of Cygnus, are now drawing near the western horizon. In the southwestern part of the sky Fomalhaut, in The Southern Fish, still shines in solitary splendor to the south of Aquarius, The Water-bearer.

Earlier in the evening the two brilliant planets, Venus and Jupiter, are magnificent objects in the southwestern sky. At the beginning of the month Jupiter, which is still in Sagittarius, will be seen some distance to the east of Venus, which is in Scorpio at the beginning of the month, but Venus will move rapidly eastward during the month from Scorpio into Sagittarius and will be in conjunction with Jupiter on the twenty-sixth, passing about two and a half degrees to the south of it. On the twenty-eighth of November Venus will reach its greatest eastern elongation, that is, its greatest distance east of the sun, when it will be visible for more than three hours after sunset. Mercury also reaches its greatest eastern elongation this month on the twenty-second when it will be in Scorpio, but it is not favorably placed for observation this month because of its far southern position.

Saturn comes into conjunction with the sun on the ninth of the month and will be too close to the sun to be seen for some weeks. Mars is now in the morning sky in Virgo and by the end of the month should be visible in the east shortly before sunrise.

The Bird Friends of a Real Boy

By VIRGINIA FROST

HE IS a real boy and a bird lover. Ever since he was a little fellow he has had bird friends—trusting, confident friends. The female purple finch perching upon his hand in the picture, seems to know that he will not hurt her, for she sits there as fearlessly as though on her own nest

MARVIN FROST, BIRD LOVER

Outside the bay window of his own room at home, this little boy has a shelf fastened there for the birds, and he puts chopped peanuts, sunflower seeds, and other delicious bird tidbits, on it daily. His efforts are always rewarded, for redbirds, chickadees, woodpeckers, purple finches, and many other members of the bird tribe, flock eagerly to his window to satisfy their hunger, affording him great amusement and pleasure.

A great deal of his knowledge of bird habits, his ability to name the different varieties of birds, and to distinguish their songs, this little boy owes to his grandmother. She is a great lover of birds herself, makes careful study of their habits, and sits for hours watching them at her bird pool. Recognizing the early interest and love of the birds shown by her little grandson, she was quick to encourage and aid him in that interest by showing him colored pictures of different birds, telling him bird stories, teaching him to listen for their songs and calls, and, when possible, taking him to see the nests and the baby birds!

It is an established custom, I believe, for most small boys to awake in the gray of the dawn, and this little lad is no exception to the rule! But he rarely requires any other entertainment than that of watching his birds. And if any other member of the family chances to awaken, he or she may hear a little voice saying eagerly: "Good morning, Mr. Redbird, how are you this morning? Your breakfast is all ready for you! Come and get it."

Autumn Shrubs of Flame

By STEPHEN F. HAMBLIN

Director, Harvard Botanic Garden

FROM field and hillside flame the sumacs, splashes of brilliance against the changing verdure of the waning year. They are familiar to us all. Still, most of us group them all together in our minds, not often stopping to consider how variously has Nature labelled them. The sumacs, cultivated and enjoyed for their autumn color, are our native species in the main, although a few immigrants from Europe and many from the Orient have joined the group.

There are three species that are easily confused, and many Nature students never notice any differences. The most tree-like sumac is the Staghorn (*Rhus typhina*), which is really tree-like to twenty-five or more feet. But as it usually suckers into great colonies it gives the mass effect of big, coarse shrubs. One close look at its leaf or twig will identify it forever. The twigs and leaf petioles are covered with close, short red hairs unlike any other twig or leaf. This down, and the forking habit of the twig, make the comparison to the antlers of the deer or stag very appropriate. The compound toothed leaves have a summer tropical appearance which becomes a glory of its own in early autumn. The colors then are of crimson shades, differing in intensity at times and in various places or seasons, but usually more red than orange. The great clusters of red, hairy fruits are also present, and these are often persistent the year around. A cut-leaved form of this was found in Maine many years ago, and it is frequently planted. In summer it resembles a giant sweetfern; in autumn it is a mass of crimson lace.

PHOTOGRAPH J. HORACE MC FARLAND CO.

THE STAGHORN SUMAC

You can identify it by the short red hairs on twigs and leaf petioles and the forking habit of the antler-like twigs.

A twin sister is the Smooth Sumac (*R. glabra*), though usually it is more shrubby than tree-like. Yet when the two run together it is not easy for the eye to tell them apart at a distance. One close look is enough, however. The twigs and the leaf petioles are smooth and white bloomy. You may make a trail in this bloom with your finger as plainly as on the cheek of a fresh plum. The shape and number of the leaflets are the same, but they are pale smooth below instead of soft downy. The difference is also in autumn color. The keynote is orange in all its shades, quite in contrast to the crimson twin, yet when both are tangled in the same fence corner it is hard to separate the color mass of each. The fruit clusters are orange-scarlet and sticky but not hairy, and the green flower clusters came in late July when the Staghorn twin had already changed to red seeds. There is also a cut-leaved variety, found a century ago in Pennsylvania, but it is less common in gardens than the cut-leaved Staghorn. Both species are very similar shrubs, equally abundant everywhere in light soils east of the Mississippi, and there is little to choose between them. They are very like, yet perfectly different. A natural hybrid between the two is known. The Smooth, in the form of varieties, is found also in the Rockies.

Another sister, Shining Sumac (*R. copallina*), which is a little shrub in the northern states, but a real tree to thirty feet in our southern region, mingles with the two and extends on to Texas. The

twig is neither red hairy nor bloomy, but red-brown with darker raised dots. The leaves are like those of its sisters, but a shining smooth green, without teeth, and the leaf stem has broad, flattened wings. The greenish flowers have much the look of the Smooth, but the red downy fruit clusters are more like the Staghorn, though smaller. In autumn the shining leaflets become most brilliant mahogany, cherry or purple beech color, or other uncommon dark reds. It is most vivid of the three, but when all are together in a pasture, each, crimson, orange or mahogany, is as wonderful as the other.

The three grow in any soil, particularly if it is poor, dry or sandy, and spread by suckers to great colonies. Seed or pieces of root are the commercial means of increasing them, but there is plenty to dig from the fields, and they will always be abundant. In transplanting, a better growth is made if they are cut to the ground a year ahead, or at time of moving, to get strong new shoots close to the ground. In a few years these will rise again to normal height, and there will be less dead parts to be cut out. Beautiful as sumac is in summer or autumn, it has its other season when the big sticks of twigs offer little detail in contrast to the winter twig tracery of other shrubs, and in its leafless months the picture is quite changed. Not that it is not still of interest when leafless, but its outline, texture and structure show a greater seasonal turnover than do most of our shrubs. In man-made landscapes it should be located with care, for natural rather than for formal effects.

PHOTOGRAPH J. HORACE MC FARLAND CO.

FRUIT OF FRAGRANT SUMAC

Its autumn coloration is in dull reds and is identified by its distinct odor. It is a popular decorative shrub.

The three graceful sisters have a black sheep brother, Poison Sumac (*R. vernix*), which imitates them in many ways and tempts the unwary to touch it. The next stage is bed and hospital. It is found in swamps and wet lands only and never in the same part of the field as the harmless ones. Nature put it by itself as a precaution. It grows much like the Smooth to twenty feet, usually in a clump, with many light ashy trunks. The leaflets are usually fewer, shining and entire but without the winged leaf stem. The petioles are a beautiful red in clever contrast to the gray twigs. Bright red petioles say "Beware!" The flowers are green and hang down in strings like the bloom of a currant, and the white berries look like white garden currants.

A bush with compound leaves and red petioles, or white strings of berries and gray bark in winter, is not to be handled. Now in autumn it tempts you by turning its leaves a better red than that of its sisters. It is absolutely the brightest red of any sumac, but it should not be allowed to exist. It is the most poisonous of all American plants, and few are the people who are wholly immune. Its sap becomes a black gum, very like that of its relative, the lacquer-tree of the Orient. So long as we have swamps we shall have it, for no human effort can destroy it wholly, and any moist soil east of the Great Plains may be its home.

The Fragrant Sumac (*R. canadensis* or *R. aromatica*) is a three-leaved low bush which is not harmful and has red autumn color. It is now a popular shrub for natural effects. It is native through the eastern half of our continent and the western half is the home of its twin, Skunk-bush or Lemonade Sumac (*R. trilobata*), scarcely different in habit but with leaflets more deeply lobed, the flowers greenish, while the odor is not agreeable. One smell makes either memorable.

The Harvard Forest

A Two-Thousand-Acre Textbook

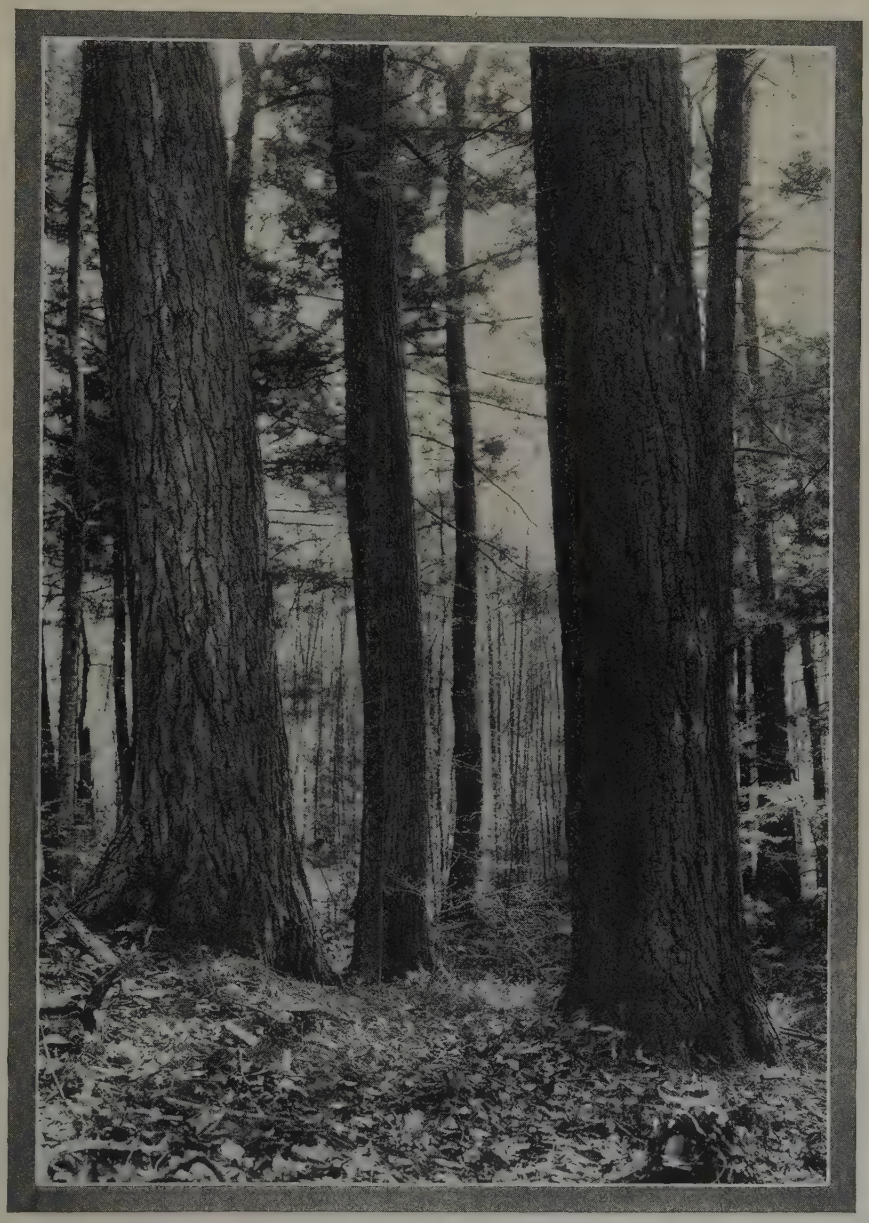
By TOM GILL

PARADISE? Not quite perhaps, and yet to me who had just come from the forests of our Northern Rockies, where fires, far-off markets, and slow growth are the rule,—well, I shouldn't be blamed too much if those 2,000 acres of the Harvard Forest did seem quite literally paradise. And you must remember, too, that the word *paradise* originally meant *a place where trees are,* and this old meaning still hovers as an aura about the word itself. For surely no forester, at least, will ever concede his paradise to be treeless.

Yet here was Cline, assistant director of the Forest, telling me of trees that could be brought to maturity in sixty years and sold for as much as twenty dollars a thousand feet. And I had just come from a country where it takes sometimes two hundred years to grow a railroad tie, and no railroad to buy it! Small wonder, I thought, as we rambled through the woods that pleasant morning, that wherever foresters foregather, be it in New Mexico or British Columbia, sooner or later the talk turns to this Harvard Forest and what they are doing there.

The reasons that made the Harvard Forest unique among the timber tracts of the United States are almost as interesting as the Forest itself. For in the first place it is located at a point in northern Massachusetts cold enough to support many of the most important trees of the north woods yet near enough to the central hardwood regions to contain a number of trees more characteristic of southern Connecticut and the Middle States. So in this area of overlap or transition zone both northern and central species find common meeting ground. Then, in the second place, the Forest is particularly fortunate in having varied markets conveniently close to its boundaries. That, of course, is the most fortunate thing any forest can have.

Broadly speaking, the intensity to which one can practice forestry is limited very definitely by the species and sizes you can find a market for. Here there are no species and practically no size of timber that cannot be sold profitably. That menacing Scylla and Charybdis of economic difficulties and silvicultural needs between which foresters so often find difficult steerage way have no terrors on the Harvard Forest. Yes; that, too, was probably one of



VETERANS OF THE FOREST

This virgin hemlock and white pine is about two centuries old. There is not much of it left, however.

the reasons that made me think of paradise, coming as I had from a land where it would be many years before forestry on the intensive scale I saw before me could ever be more than a hope. And the reason, as I say, lay in the absence of markets.

Didn't there exist once a philosophic school whose belief was that if your need is great enough the gods will always grant it? Well, back in 1907 Professor Fisher of Harvard felt that he needed a forest, needed it badly, and so in that same year those 2,000 acres were donated the university. Of course, Professor Fisher may have helped the gods by a judicious suggestion or two—but that's beside the point.

The Forest consists of three separate tracts located in the town of Petersham in northern Massachusetts. One year after its acceptance it was put under management, and today we have before us here the results of sixteen years intensive forest practice. They are results that tell us much.

Now forestry, you know, is with us a young profession, and the working out of its processes are matters of years, decades, and sometimes centuries. Even up to a comparatively few years ago the methods involved in actually growing and maintaining timber crops had been scantily developed in this country, and to find an organized forest where the various methods of silviculture were in successful operation it was necessary to go to the old world. It is because today the Harvard Forest is very close to that unique condition that it so admirably serves as a model forest to demonstrate the practice of forestry.

It serves, too, as an experiment station for forest research, and forestry has great need of these. For each forest region has its own problems, and when you come right down to it there is a deal of fundamental knowledge regarding the growing of various tree species that we do not possess. Acquiring such knowledge requires time. Obviously, it

SLACKER ACRES. THERE ARE SOME EIGHTY MILLION OF THEM

Abandoned and unproductive. This land has exactly the same potentialities for growing timber as the plantation of pine shown on the next page.

requires more time in the case of forest crops than in any other. A year will often serve to prove the wisdom or folly of your practice in, let's say, the growing of wheat or onions. But fifty or a hundred and fifty must roll by before we can test many phases of our forest practice. So in its rôle of forest laboratory the Harvard Forest is helping to supply just this kind of information for the region that it represents. Its large plantations, its methods of practical woods culture are giving to the profession fundamental data for the practice of forestry.

The first bit of the Forest's history was told me by a hemlock stump. It had reached the patriarchal age of one hundred and eighty-eight years when cut. Now it may have seemed merely a rather large stump, which, during the first hundred and eight years of its life had grown in diameter exactly four inches; it was, you see, almost standing still. And at the hundred and eighth growth ring was a scar. After this the tree had grown with such amazing rapidity that in the next eighty years it had put on twenty-four additional inches. Its growth rate since the scar had leaped almost ten times!

That's all one could see, but what the stump actually said was this: "I stood here for over a hundred years overtopped and shaded by my fellow hemlocks, and by the tall pines, getting no light from above and little water from the crowded root space beneath. So I was dwarfed and feeble, and it was a question at times whether I should ever pull through. Then eighty years ago men things came and cut all the trees about me. Once, in pulling out a log they bruised me and the scar still remains. But now at last I was able to reach the sunlight and get my share of food from the soil, and I grew rapidly for the next eighty years. Then last year again came the men things and felled me."

When the little town of Petersham was first settled in 1720 the Forest must have appeared very different. For small fragments of the original For-

ACRES THAT HAVE GONE BACK TO WORK

These thrifty red pines were planted ten years ago on just such land as is shown on the preceding page. Director Fisher of the Harvard Forest is standing among these forest youngsters.

est still exist showing that beyond a doubt the virgin timber consisted of a mixed stand containing hardwoods, pine, and hemlock of many ages. A century later about 60 per cent of the Forest was in farms or pasture. Then immediately following the Civil War came a decrease in population. Large areas of cleared land were abandoned, and Nature, undisturbed by plow or ax, took up her task of bringing back the forests.

But Nature didn't bring back the original combination—the climax types, as foresters call them. Not at first. Instead, a number of temporary types seized the land. Large areas of pastures came up to pure white pine. Weed trees such as gray birch, pin cherry and red maple preempted the land. And when these Harvard Foresters first took the tract in hand they found everywhere a mixture of species not truly characteristic of the soil and not of the kind toward which Nature herself is slowly working—and, worst of all, not especially valuable. So it became part of the problem of management here to so handle these temporary transition types that they might be brought back as quickly, yet as economically, as possible to the species of greatest value.

> *"The test of the value of a tree is not its size, but how much value and utility it furnishes to the population. As I see this problem of conservation it is double barreled. Until we are able to utilize the tree with a return that will enable us to put some money back in the land we cannot have forestry. On the other hand, we cannot have the tree unless we know how to take advantage of and maintain the permanent productivity of the forest. In all the sixteen years the Forest has been in operation the thing that has been forced upon me over and over again is that we cannot have more silviculture, we cannot put more intensive treatment into the woods until we can find use for this or that unmerchantable species or waste product. So we have been constantly jumping from one end of the problem to the other."*—Richard T. Fisher, Director of the Harvard Forest.

The first step then was to determine just what they had to work with. A careful timber estimate showed a merchantable stand of 10,500,000 board-feet. This was the working capital. The yearly increase, in the form of new growth, amounted to 335,000 feet. This was the amount that theoretically could be cut yearly on the Forest for all time, if the Harvard Forest was to be a perpetual wood factory.

Now, sixteen years after the Forest's beginning, and after 2,500,000 feet have been sold, the working capital is increased to over 12,500,000 feet, and the annual growth approximates 400,000. Talk about eating your cake and having it, too! Yes, and every one of those cut-over acres has been successfully reproduced. More than that, the area of production has been actually increased by 150 acres.

Located as the Harvard Forest is with an average haul of less than six miles to the wood-working shops of Athol, and close to the great chair factories of Gardner, no species and no grade of lumber is unsalable. The better grades of pine go to sash and blinds. Pine of straight grain and long-jointed stock is in great demand for match blocks. Poorer quality pine is used for toys, cheap furniture and boxes. Ash and oak become high-grade furniture and bring almost double the price of pine. Less valuable hardwoods find markets as cheaper furniture, toys and novelties.

Once more before that memorable day was done the contrast between this Elysian Forest and others that I have known came to me. Assistant Director Cline had just told me that in the history of the Forest there had been exactly four fires, covering a total of about twelve acres, and destroying timber estimated at not more than seventy-five dollars. Tell that to any forester who has known for summer after summer the bitter taste of smoke on the fire line, and has seen thousands of acres of towering timber reduced to smoke and gray ashes before his eyes. It's probable he'll ask you wistfully if they need another forester back there.

Now timber management is not quite so simple a matter as cutting your trees and then waiting until more come up. Very often they won't come up. More often if they do come they are not what you wanted. This business of timber growing is something of a science. Also, it is something of an art. If you could treat a forest area like an algebraic computation or a chemical formula this forestry business could be reduced to a rather cut-and-dried basis. But you can't. Instead each situation provides its own problem.

Take, for example, the handling of stands in which different species are growing. We may know, let's say, just the right kind of management for a stand of pure red oak, or a stand of beech, or a stand of maple. But when you find an area in which all three of these are represented your knowledge of the behavior of the individual species won't help much. And here are a few of the problems confronting the managers of the Harvard Forest. How shall we handle these mixed stands? How can we develop types more permanent than pure pine? How can we convert our gray birch and other inferior hardwoods into valuable timber crops? What is the best way of reproducing pine?

Take that question as to the best way of reproducing pine, which is a mighty important one.

Imagine a block of pine and hemlock trees ripe and ready for cutting. Now the chances are that, if all the trees are cut, the area will immediately spring up to gray birch and other less valuable species which will prevent pine and hemlock from starting. Pine and hemlock is a desirable mixture because pine, when crowded by the hemlock, prunes its trunk early and produces a greater amount of clear, valuable lumber. It is also desirable that hemlock, a slower grower than pine, should get a few years' start. So our problem finally is: How shall we keep out undesirable species and secure a satisfactory stocking, first of hemlock, and then a few years later of pine?

Here's how they've solved it in the Harvard Forest. First a very moderate thinning which allows sufficient light to fall on the forest floor for the growth of hemlock. Pine seedlings will not come in at this stage, since they need more direct light. After the young hemlock trees have been well established—probably in five or six years—a second cutting is made, and this time the crown canopy is opened enough for pine seedlings to start. When these in turn are successfully established the rest of the older trees are removed, and so you have left a fully stocked and thrifty stand of pine coming up beneath the hemlock. This method is known among foresters as a shelter wood system.

In seeking reproduction of pine alone a simplified form of shelter wood is used. A thinning to reduce the crown canopy almost one-half is made a few years before the stand is to be cut. This results in a dense carpet of young pine, and when these are established the remainder of the stand is cut clear. Literally, thousands of seedlings to the acre are obtained by this method. I have seen as many as 25,000 young trees on some of the more densely reproduced acres. Not bad, when you consider that one-twentieth of this number is regarded as a fully stocked plantation when set out by hand.

But even now, with his young stand of pine well started, your forester may not sit back for sixty years and expect Mother Nature to do the rest. For, if left to shift for themselves, the pine would probably be crowded out by the faster-growing hardwoods within the first ten years. So the problem now becomes one of getting a good group mixture of hardwood and pine, and of preserving the best of the hardwood reproduction. If, as often happens, young hardwood growth exists before the older stand is removed, this advance reproduction is cut. In this manner our pine will be relieved of competition for two years at least. Then four years after cutting comes a first weeding. On the dryer areas pine is favored, and on the richer soils a stand of the better hardwood species is sought for. Usually, one more weeding is necessary before the stand can be turned over to Nature.

Before the sun set that day my guide had shown me many other forest problems, each intensely interesting, each requiring for its solution wisdom and foresight, and very patient investigation.

"You haven't seen half of it, you know," the assistant director said when I thanked him for his guidance.

Well, of course I hadn't. A 2,000-acre laboratory isn't to be absorbed in a day or a month. But I had seen a very real prophecy of what some day we can and will do with our woodlands.

The Insistent Katydid

By EDWARD A. PREBLE

THIS IS one of the soft, delicate, graceful insects so often seen about low bushes, and commonly called Katydids, though the entomologists tell us that the true Katydid, the one who so insistently reiterates through the night the doings of Katy, stays in the high trees and is very seldom seen. This one is usually of the most beautiful clear-green color that one can imagine, like the brightest of the green leaves on which it dwells, though brown or bright pink individuals are occasionally found.

They seem so gentle and good-natured that one is often tempted to form a closer acquaintance, and it gives us a distinct shock to find that the insect is capable of dealing a sharp nip. Since it is scarcely to be expected that the wood Katy should know our intentions were kind, one cannot do else than forgive her and let her live her short happy life in peace.

The eggs of this Katydid are deposited in holes in the ground, and from them hatch tiny young ones not differing greatly in shape from their parents.

The Lure of Nature Photography

THERE is a joy of achievement that has few equals in recording upon a photographic film a page from the great story of Nature. One of the reasons for this satisfaction comes from the fact that wild life is not easy to photograph. It is not like "snapping" a picnic party in the woods. Nature does not pose. Patience, study and perseverance are necessary, making the final accomplishment all the more valuable.

That Nature photography has a widespread charm is proved by the many photographs submitted in the November Amateur Nature Photographers' Contest. On the page opposite this are found the seven outstanding photographs. The winning study of the English swans, by Mr. Belden, sets a high standard. It is attractive in human interest and in photography. It can be equalled and even surpassed, however, and it is expected that subsequent contests will bring out even more attractive photographs.

It was impossible to publish one or more photographs submitted by the entrants in the November contest. Many of those which had to be returned were worthy of commendation. Accordingly, special mention should be made of the following for the merit of their entries:

Winifred M. Altree, Longmeadow, Mass.
Ralph Armbruster, Baldwin, N. Y.
H. K. Anderson, Pittsburgh, Pa.
Miss L. M. Bulkley, Cheboygan, Mich.
Wm. H. Brogan, Governors Island, N. Y.
Miss Elizabeth Braunecker, Cincinnati, Ohio.
Miss Ruth Carryer, Columbia, Mo.
Kenneth S. Clark, Coniston, Ontario.
Jose G. Dixon, Wilkes-Barre, Pa.
Mrs. F. B. Fuller, Fort Atkinson, Wisc.
Daniel M. French, Lynn, Mass.
Pearl Heath Frazer, Grand Forks, N. Dakota.
Willard C. French, Sheffield, Mass.
Leo. Hopper, Chillicothe, Mo.
Islay & Anita Hinner, Cincinnati, Ohio.
Richard Herman, Washington, D. C.
O. J. Hitchcock, Havelock, Nebraska.
Dr. E. L. Hendricks, Lanark, Ill.
I. K. King, M.D., Pittsburgh, Pa.
Howard Knott, Waterloo, Iowa.
Geo. T. Lacey, Binghampton, N. Y.
Robert B. McNitt, Riverdale-on-Hudson, N. Y. C.
Clara E. Martin, Cedar Bluffs, Nebraska.
Miss Berthe E. Merrill, Minneapolis, Minn.
John Newton, Edmonton, Alberta, Can.
Miss Pearl Peterson, Chicago City, Minn.
Philip H. Pope, Walla Walla, Washington.
Mr. R. Pelton, Footes Bay, Ontario, Can.
Miss Catharine Robinson, Rothesay, N. D.
Billy Shinn, Long Branch, New Jersey.
J. Adger Smyth, Salem, Va.
Elizabeth A. Schmidt, Dundee, Minn.
Thelma E. Slevin, Berkeley, Calif.
Herbert A. Stevenson, Falls Creek, Pa.
James H. Stoudt, Hastings, Minn.
Blanche Thompson, Eaton, Ohio.
Mrs. Rachel Farnum Tucker, Woonsocket, R. I.
Miss Clara C. Voten, Proctor, Vt.

American Education Week

EDUCATION is a day by day task. It is never finished, in fact, although many fall into that form of laziness that lulls them into thinking that their education is over.

To meet this is one of the aims of American Education Week. Its great aim, however, is to turn the attention of the nation to the great educational system that we have built up and the vital necessity that it be strongly and progressively sustained. The week of education this year is from November 16 to 22, and a far-flung observance will be carried on under the joint auspices of the United States Bureau of Education, the American Legion, and the National Educational Association.

In the program each day will have its particular dedication. Monday the 16th is designated Constitution Day, bringing home the story of democracy and our fundamental law. Tuesday is Patriotism Day and Wednesday School and Teacher Day. Thursday, November 19, is set aside as Conservation and Thrift Day, linking together the story of conservation of our national resources as a fundamental lesson in thrift. Friday is Know Your School Day and Saturday Community and Health Day. Sunday Is for God and Country Day.

The members of the American Nature Association are again urged to cooperate to the fullest possible extent in making this week a success and in bringing home to the people of the United States the great issue to which the week is dedicated.

JUST DAISIES
Gray Colgrove, Canaseraga, New York.

ANGORA KIDS
Miss Laura H. Osborn, Blue Mound, Illinois.

The November Winner

A PERILOUS PERCH
Martha Blackwelder, Stanford University, California.

ENGLISH SWANS
Cyrus Belden, 370 Seventh Avenue, New York City.

HAPPY IN PASTURE
Mrs. S. A. Keller, Steamboat Springs. Colorado.

THE SEXTETTE
Pearl M. Peterson, Chicago City, Minnesota.

A HARDY TREE
O. J. Hitchcock, Havelock, Nebraska.

NATURE EDUCATION
Dr. E. LAURENCE PALMER, Cornell University
Director
MRS. ANNA BOTSFORD COMSTOCK Associate Editor

Nature Study in the Schools of Berkeley

By Clelia Paroni

THE MAIN object of the study of Nature in the Berkeley, Calif., elementary schools is to give each child the opportunity of becoming acquainted with the simplest phases of plant and animal life and with the primal laws of their development; to keep him active, interested and looking for new aspects of the life about him, making him a happy and helpful member of his group.

Nature work is part of the class work from the kindergarten to the high sixth grade, seventy-five minutes being scheduled for it in the lower and fifty minutes in the upper grades. Being correlated with language, reading, geography, art, music, and manual work, more than the allotted time is often given to it.

In the lower grades the work consists, as much as possible, of the observation and study of live forms of plant and animal life, found in the child's home environment. Where classes are small enough and where parks, hillsides, the university campus, children's home gardens or school gardens are located in the neighborhood, field trips are taken. With the help of parents, excursions to zoos, museums, Lake Merritt in Oakland, Golden Gate Park in San Francisco, are often organized.

Where excursions and field trips are not possible, reports of individual's experiences are depended upon for actual observations of live things. Live material is brought to school by the pupils and sometimes by the teachers as the basis for live Nature lessons.

In some classrooms there may be found an animal-box, an insect cage, or turtle and frog ponds, window-boxes, fish-tanks, or bird cages. Here are studied the interesting habits of small pets or the young of domestic animals, the life cycle of caterpillars and amphibians, and the growth and development of plants and animals.

A NATURE STUDY EXHIBIT

Shown by the Berkeley schools at a convention of teachers at Oakland, California.

When live materials cannot be procured to demonstrate some phases of a lesson, use is often made of habitat cases, flat pictures, stereographs, slides and films. These are sent out to the schools by our own Visual Instruction Department or can be borrowed from the Visual Department of the University of California.

Our most successful type of work has been based on outdoor observations and the bringing in of live material by the children, followed by discussions in the classroom. This has materialized often into collections, booklets, charts, sand-table projects, the planting of window-boxes and of tables holding pools for water forms, stocking insect cages, holding pet shows, carrying on gardening and ornamental planting about the school grounds, organizing poultry clubs and Audubon clubs, Junior Park Commissions, giving Arbor Day programs, closing the term's work with dramatizations and various other activities.

These Nature activities have been found to greatly vitalize the other subjects of the classroom, and teachers have admitted the greater interest that pupils have shown in reading and in oral and written language work and have also acknowledged a new and happier interest on their own part in their teaching work.

The Berkeley Nature Study Course has been so developed that the kindergarten, first- and second-grade children first make the acquaintance of such plants and animals as are to be found in their immediate home environment, encouraging discussion and interest at home as well as at school. In one kindergarten where such work had been carried on, the spring term's work was fittingly closed with a dramatization of the coming of the wild flowers and the visits to them by the bees, butterflies and birds. Original verses were composed by the children and set to simple melodies, and costumes and dances were planned by them also. Thus the Nature work was correlated with language, art and music.

In the first grade the child becomes acquainted with plant and animal forms about a country home, thereby learning about the various vegetables of the truck garden, the fruits of the

orchard, the cows, horses, pigs, sheep and goats of the barns and corrals, the crops of grain and corn raised in fields and pastures, and the birds and small animals of the open places. The farm homes are represented in sand-tables. Where a patch or border is conveniently located on the school grounds, a few plants are raised. During the autumn term a study of the development of the flowers of wild and garden plants into seed-pods and a study of their various methods of dispersal result in collections of seeds and pods and in the making of paper-boxes and raffia baskets as containers. A discussion of the various autumn fruits brought to school often leads to interesting activities as "Keeping a Fruit Store," "Making an Apple Orchard." "Drying Apples," and "Making Apple Jelly for Winter Use."

The second grade's work is very similar to the first grade's work, though more discussion takes place about forms seen on trips taken by individual pupils or by the class. More emphasis is placed on the similarities existing between the live things studied and the children themselves and upon the use of these forms to us and upon our care of them.

In the third and fourth grades the plant and animal forms studied are observed through all the varying seasons of the year to find out what changes and what developments go on from one life cycle to another. So bulbs are grown and slips of plants are placed in boxes, pots and planting tables for indoor decoration; insect and animal cages and pools are fitted up for the study of caterpillars, spiders, frogs, snakes, turtles and various fish.

The value of these plant and animal forms to man is emphasized especially in the fourth grades and the necessity for their protection considered. Pet exhibits, Audubon clubs, Arbor Day programs on the conservation of the trees, flowers and birds, the collection of a few specimens of wild flowers, of tree's leaves, seeds and bark, are some activities carried on in these grades.

Half of the fifth and sixth grades engage in active planting work on their school grounds, either growing vegetables where ground is available or setting out and caring for shrubs, vines, trees and flowering plants about the schoolhouse. In one or two instances, rabbits and chickens have been raised in pens and hutches made by the boys in their manual training periods. A number of these gardening and animal-raising classes have organized into clubs with officers, keeping record books, holding savings and commercial accounts in local banks, making out checks, and writing business letters to seed-houses, to university authorities, and to government departments of agriculture for special information. One such class organized as a model city with mayor and councilmen and placed its model backyard under the direct supervision of park commissioners. It constructed a model of its garden with fences, pens and hutches under the supervision of the manual training instructor and its own class teacher.

At two schools where fifth and sixth grades do not engage in schoolground activities, Junior Park Commissions have been formed through an appeal sent out by the Berkeley Park Commission a few years ago, asking for help in saving shrubs and trees from being destroyed by careless children and adults. Some interesting models of parks were made in sand-tables.

During the autumn and winter months, when stormy weather prevents outdoor work, more formal lessons on the structure of plants and animals are carried on. It is at this time that special study is made of bird migration and protection through excursions and reports made on observations of the water-birds on our local bird reserve, Lake Merritt. Some classes have represented the lake in sand-tables, studying each species of water-birds found there and placing it in its preferred location on the model lake.

Other fifth- and sixth-grade classes study the uses of the forests and their conservation in California, the conservation of the soil cover and water supply, of birds, fish and mammals in these forests, of the value of conserving water for irrigation in California; and of the sources and distribution of our local water supply.

To make the Nature work in our schools more successful, we need a less crowded curriculum, less interruption of the classroom work by outside agencies, definite and more time on the program for Nature work, less crowded classrooms, larger rooms to accommodate Nature equipment, some way of taking classes of children more easily to visit interesting Nature things at a distance, and the adequate preparation of teachers who come to us from the teacher-training institutions to teach Nature work.

A Few Nature Teachers I Have Known

By E. LAURENCE PALMER

THE COMMONEST question asked by correspondents of the Nature Education Section of NATURE MAGAZINE is, "Am I fitted to go into Nature work professionally?" Some of these people have read of Nature guiding in the mountains and see themselves leading a band of tourists through the wilds. Others have visited summer camps or have heard of camps and think that Nature work offers an ideal opening for them to spend a pleasant summer with nothing to do but enjoy sunsets and talk about the dear little rabbits. Still others face the issue with an appreciation of the necessity of the work which must be done if the good things which Nature has to give us are to be perpetuated or available to succeeding generations.

It is, of course, difficult to outline the only good qualities which are essential to success in Nature work or to suggest the handicaps which might indicate probable failure. I can more profitably analyze the qualities possessed by those individuals whom I have met and who have helped me most in Nature work. I am deliberately omitting here recognition of the influence of the writings of certain of my friends. The personal influence of an individual is not always the same as the influence of the person's writings, and this is true in two directions.

I have a request from an individual who asks if she is too old to go into Nature work. The age variation in my Nature teachers equals approximately the age variation of my acquaintanceship. The six-year-old son of a neighbor puts me to shame by the ease and fearlessness with which he handles and catches for me certain reptiles which I know are perfectly harmless but which I was taught to fear when I was in the grades. He has taught me many other things, too, though he himself does not even consider himself a teacher. At the other extreme is the host of older people, trained or untrained, who have shown me here and there things which I otherwise would not have noticed. The age of the teacher is not so much

a factor as the age at which the individual takes up the work. An individual who has gone through half his allotted years without being fired by the truths of Nature probably will not succeed so easily as the individual whose life has been full of experiences fitting him for such a work.

This brings up another point asked in the correspondence. Can a woman expect to succeed as well as a man? To my mind the most successful Nature teacher living is a woman. The matter of sex should make no difference. One of the most successful Nature teachers in our Boy Scout Council last year was a young woman, and one of the most successful Nature teachers that I have known to be in a girls' camp was a man. This does not in either case indicate that the teacher should be of a different sex from the pupil. There are probably as many big openings for women as for men in Nature work.

When it comes to matters of training and experience we can draw more definite lines. The individual with broad training and experience obviously can, with equal opportunity, outstrip the individual without these. Formal training is not, however, always necessary. I have just left a Pennsylvania farm where lives a man with little or no technical training. His farm borders a peat bog, and as you walk through his woods you will come upon little wire enclosures where he has his rare orchids and ferns protected from careless passers-by. In the bog is the nest of a marsh hawk that he tells you about. The mother hawk was shot this summer because she kept killing chickens. The farmer friend offers the information that this is contrary to what the findings of the Biological Survey would indicate. He tells you from his experience that this hawk fed largely upon songbirds and draws a vivid picture of wounded orioles and song sparrows near the nest. Near this man's farm is a Girls' Scout camp, and no matter how much technical training the Nature councillor may have she must bow in many things to the superior ability of this farmer. In another camp the cook has a splendid collection of butterflies which he has made during odd hours. He is probably more widely known as a student of lepidoptera than as a cook, though his apprenticeship as a student of butterflies was not served in any university. If there is any one thing recognized by these untrained individuals, it is the value of training. If there is any one thing recognized as valuable by trained but inexperienced individuals, it is the experience of people like the cook and the farmer. With neither training nor experience one cannot hope to succeed. In spite of this a student came to me last year in search of a Nature position because she "loved Nature so much." I asked her what a song sparrow looked like, and she said she didn't know, but she was taking botany and thought she would find out soon. So far as I know she has not found out yet, because her interest in Nature disappeared when she could not get a job immediately.

While I have seen successful Nature teachers who were not trained, I have never seen one who was lazy. I have never seen one who gushed. I have never seen one who was afraid to admit that he did not know or who, when he found himself in error, was not honest enough to admit it. I have never seen a successful Nature teacher who was cruel, who could not be trusted or who did not love both the particular phase of Nature which interested him and to help those whom he taught. One and all they practiced the Golden Rule, though there were probably as many who were not orthodox church members as there were who had such an affiliation. They are almost to a person optimists not pessimists.

Generally speaking, the Nature teacher has to have good health and physique. Last year a woman came into my office saying that she wished to be a Nature guide and wished me to recommend her for work in national parks. I took her for a walk of less than two blocks and she was completely "winded." I did not recommend her. After listening to her awhile I felt like recommending that she read Rupert Brooke's, "The Voice." I was kind enough not to do so. I would recommend that all who feel like going into the work read that poem and judge themselves accordingly.

Few types of work make greater demands for versatility than Nature work. The untutored person expects the Nature leader to know everything about geology, ornithology, botany, entomology, limnology, vertebrate zoology, pedagogy and what not. The individual who is "afraid of getting himself into hot water" should hesitate about taking up with Nature leadership. He will find himself there most of the time.

In spite of all that has been written in this article of a discouraging nature, I would do all that I can to encourage more people to go into Nature leadership. There are few types of work for which there is a more genuine need or more general demand. There are few types of work for which the returns, in satisfaction at least, are greater. The Nature movement will prosper in spite of the handicaps of unfortunate leadership. It offers an ideally, natural mode of living for those who have the right combination of training, experience and interest coupled with the willingness to work longer hours than are generally demanded by other teachers and leaders.

Nature Study Review

Suggestions for the use in Nature Study of the articles in this issue of NATURE MAGAZINE

By ELIZABETH K. PEEPLES

Teacher in Charge of Nature Study, Washington, D. C., Schools

Canada Geese —Trumpets of Dawn The sportsman of today, it is claimed by many, has done more to secure legislation for the protection of game birds and animals than any other person. Here is an instance of evolution in ideas and ideals, most cheering, since in the old days "men did shameful things in the name of sportsmanship." Small wonder when "books for boys fostered the belief that all wild creatures . . . were created for slaughter." In spreading the gospel of protection the Nature teacher finds his highest mission. With this story of the Canada Goose the children should compare those of the Trumpeter Swan, Canvasback Duck, Mallard, Wild Turkey, Bob White, Passenger Pigeon, Woodcock and Egret. Give them these references:

"Town Forests As Bird Sanctuaries," NATURE MAGAZINE, April, 1925.

"The Great Rainey Bird Sanctuary," NATURE MAGAZINE, May, 1925.

"A Municipal Camp for Wild Ducks," NATURE MAGAZINE, April, 1924.

"World-Wide Bird Protection," NATURE MAGAZINE, Dec., 1923.

A letter to the Bureau of Publications of the Department of Agriculture, Washington, D. C. will secure a copy of the Bulletin giving "Game Laws for the Season of 1924–25."

* * *

Master Architects of the Jungle The nests of mud-daubers and of our familiar paper-wasps, Polistes who builds one tier of cells without a cover and Vespa who builds several "floors" well encased in an outer wrapper, are easily obtained, though the collector must be careful, if he desires an uninhabited nest, to wait until late fall or winter. Such nests are the material with which to begin the study of wasp architecture. Comstock's "Handbook of Nature Study" supplies lessons on the mud-dauber and yellow jacket. A teacher desiring more detailed information will find it in Margaret Morley's "Wasps and Their Ways." When children have become acquainted with the architecture of our native masons, paper manufacturers, and potters, they will appreciate the wonders of "Master Architects of the Jungle." There are "masons, tailors, carpenters, and decorators" in the bird world as well as among wasps. The class should consider bird nests with reference to these methods of building, and make comparison of avian to insect ingenuity. Pictures illustrating the following articles in NATURE MAGAZINE fit this subject:

Good Qualities of Our Feathered Workmen, Feb., 1923.

Photographing Insect Life, May, 1923.

Friend Spider, Nov., 1923.

(Picture of "Pan's Pipes" made by a wasp).

* * *

The Man-o'-War Birds The Man-o'-War Bird, though known to most Nature students only through museum collections or pictures, has peculiarities which may be noted in familiar birds. The description of its flight "on motionless wings, floating in majestic circles through the sky" applies equally well to the turkey vulture. A child who has watched the latter, and studied pictures of the former, may with the help of paragraphs one and four of the article form a fairly accurate mental picture of this champion aviator. Other birds remarkable in flight, such as the swallow, swift, and albatross, should be compared. In certain aspects of its family life the Man-o'-War Bird reminds one strongly of the pigeon. Many children have raised pigeons or watched them, and know the number of eggs in each clutch, the division of labor during incubation, the condition of the newly hatched young, and the method by which the young obtain food. Having refreshed their memories on these points by observation and discussion the class might with profit read the article and compare this native of the tropics. Ask the children to add to their Bird Scrap Books pictures of birds which are particularly graceful, rapid, or untiring in their flight, and pictures of baby birds for a comparison of numbers in various bird families, condition of the young, care given by father birds to eggs and young, and feeding methods. Notes of their own observations on these matters are even more valuable, but remind the youngsters that a respectful distance is the courtesy due every bird family. NATURE MAGAZINE, February, 1923, contains an article on "Pigeon Raising and Racing."

Extra copies of the Nature Study Questionnaire, published in this Department in the October issue, may be obtained by writing to the Editor.

* * *

Museum Magic This article and illustrations are sure to inspire in the young reader the desire to wave a magic wand in imitation of the experts who produce museum habitat groups. Much that goes to the making of such a group could be done along amateur lines by members of a Nature class for its own school museum. The Educational Department plans to publish an article in the near future giving detailed suggestions for the making of such groups.

* * *

An Outline of Unnatural History To teach a child to read with discrimination, his mind alert to judge the truth or falsehood of the statements before him, is to equip him with a safeguard which he will need all his life. Facts and fallacies found in books on wild life make a good beginning in this training, as the youngster is able in many instances to check them by his own observation. The teacher can readily make a "true false" assignment (after the manner of the "true false test"), basing it upon certain of the Nature myths given in this article, or upon local superstition. For example the child may be asked to report at the end of a specified time which of these statements is false and which true:

1. Moles have a habit of coming to the surface of the earth precisely at noon each day.
2. North American moles live almost perpetually under ground.
3. The beaver's tail helps as a rudder in swimming.
4. The beaver uses his tail to plaster his dam and lodge.
5. The beaver also uses his tail as a sled, and a platter.

Not only will the student be awakened to the need of judging what he reads, but a new incentive to outdoor observation will be supplied.

* * *

Shrubs of Flame Sumacs grow so abundantly east of the Mississippi that almost any Nature class which can get beyond city limits may study at least one variety. Ask the children to make a chart giving the distinguishing characteristics of the five sumacs described in the article, and supply the information under each topic such as height, leaves, flowers, fruit, autumnal color. When in the field the chart may be used for reference in identifying any sumacs found. A sumac transplanted to the school lawn adds much beauty in summer or autumn, but as the author suggests, should be located with care because of its changed appearance in winter. The warning against poison sumac cannot be made too emphatic.

* * *

Cats and Motherhood The development in children of kindliness toward dumb creatures is an outstanding aim in Nature Study. On no ground can sympathy for the cat be so well founded as on that of her devotion as a mother—and more striking still, as a foster-mother. If it is sometimes necessary to admit her selfishness and cruelty, let us not forget this very appealing trait.

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Questions and Answers

The American Nature Association will be glad to answer such questions as its members ask about Nature.

QUESTION: *Many of the leaves on my rose bush have a practically complete circular section missing. I have looked for worms or bugs but never found any. This summer I saw a honeybee on a rose leaf, nipping, nipping, and as he nearly finished cutting his circular section he put his stubby little legs carefully around his prize. When the last nibble freed it he sailed away, tightly hugging the green shield against his chest. What do bees do with these myriad little discs?—J. V. J.*

ANSWER: The bee which you observed cutting circular holes in the leaves of your rose bush is undoubtedly one of the species of *Megachile,* usually called leaf cutters. The female, which does the cutting, glues the pieces together very skillfully to make tight, thimble-shaped cells which fit in some suitable cranny or in burrows made by her in wood or earth. In these cells, of course, the eggs are laid.

QUESTION: *This year I put up a swallow box in an apple tree. No birds bred in it as far as I know, and the only birds seen around were tree swallows and bluebirds. This August I looked in the box and found a nest composed almost entirely of old chicken wire. This could be easily obtained from a trip not far away. Could you tell me what bird it might be?*

ANSWER: House wrens are birds—and practically the only birds—that find great joy in filling up extra nest boxes with coarse material such as you found in your nest box.

QUESTION: *I have seen this bird in three localities, once in Connecticut on the shores of a small river, again in New Jersey among the pickerel weeds of a pond, and now in New York along the banks of a creek. It has dark grayish-blue wings and a rusty back. The legs are a bright orange. When flying its cry is like the noise one makes when blowing on a blade of grass. What kind of a bird is it?—F. F.*

ANSWER: This question is an example of one that is very difficult to answer on account of lack of information. In framing such questions, inquirers should note the comparative size of the bird, color and size of bill, markings and more details. From the above description the nearest guess as to the identity of the bird is that it was the Lesser Yellowlegs (*Totanus flavipes*).

QUESTION: *Is the jaguar any relation to the tiger? Is the mussel any relation to the clam?—C. C.*

ANSWERS The jaguar and the tiger are related only in the sense that they are both large cats still usually referred to the same genus—*Felis*—though by some authors considered to be generically different. The jaguar is, of course, a far different species from the tiger. The same applies to the mussel and the clam. Both belong to the order of mulluscs but are far apart in genera and species. They are therefore related though not closely.

QUESTION: *In your August Nature Calendar it says that this is the time to sugar for moths. How do you do this?*

ANSWER: Sugaring for moths consists of putting a mixture of molasses and decaying apple pulp on tree trunks or other convenient places to attract many night-flying moths.

QUESTION: *Please tell me the proper food for a baby wren and how much water should it have a day?—A. H.*

ANSWER: You can feed the baby wren a few drops of water a day, a drop at a time. It will eat hairless worms, small angle worms, bits of hard-boiled eggs and bread crumbs.

NOTE: Will correspondents with the Questions and Answers Department kindly be sure that their names and addresses accompany inquiries. All are answered immediately by mail and the more interesting are printed.—EDITOR.

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Can you imagine one hundred miles of Peony bloom in one field at one time? Our planting comprises over 1000 varieties from which to make your selection. We are making you the following "Get Acquainted Offer" at very low prices. These are all splendid strong divisions with from three to five eyes. Every Peony in this collection is a gem. Try them.

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Should be planted by the entire nation—vigorous growth and lots of bloom. All one-year-old roots.

Edulis Superba—Mauve Pink	$0.75
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The flawless, exquisite collection for the artistic taste.

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PEONIES FOR PLEASURE. A beautiful booklet de luxe. A great treat for every Peony admirer. Gives facts and helpful cultural directions. Send for copy now.

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1 Teaspoonful in 1 quart of water when watering plants.

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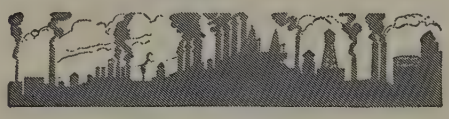
Many Wild Horses

It will no doubt come as a surprise to many to hear that there are so many wild horses on some grazing ranges of the public domain that they are regarded as a menace. This is, however, the testimony of many witnesses who appeared before the Senate Committee on Public Lands during its recent hearings in the west. They almost unanimously urged that something be done to check them if the ranges were to be of any use to cattle and sheep, and declared that nobody had dared start killing off the horses, anticipating active opposition from humanitarian and conservation organizations. Perhaps there is another solution.

White Snapping Turtles

No doubt many will recall the article on snapping turtles published in the February, 1925, issue of NATURE MAGAZINE, telling of the experience of Mr. Cecil C. Hahn, of Wilmington, Del., in hatching snappers. Mr. Hahn now writes that this fall's hatching progressed finely and that, to his astonishment, the total of more than three hundred included ten pure white snappers. Another interesting instance of albinism.



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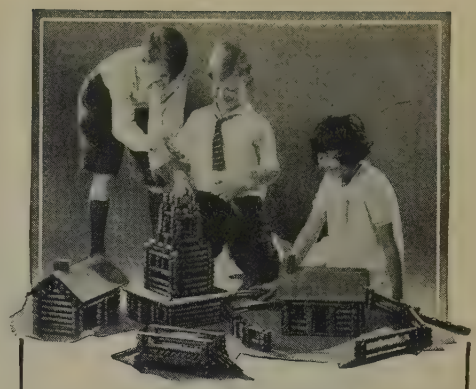

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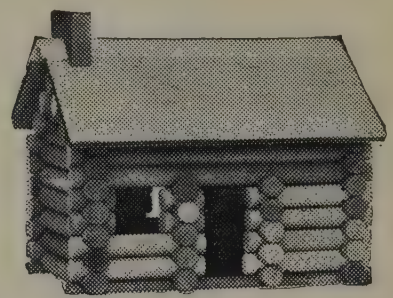
"The Building Material of our Forefathers"

For Christmas Gifts—Playthings that typify "*The Spirit of America.*" Our Design Book shows how to build "*Lincoln's Log Cabin,*" "*Valley Forge,*" "*The Log Meeting House,*" and other historic buildings. Girls can build houses, chairs, tables, etc., for their dolls. Boys build bridges, block houses, farm buildings, fences, in fact all forms of log construction.



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Both boys and girls from 4 to 14 enjoy seeing complete Cabins, Churches, Forts, Doll Houses, Rustic Furniture, created by their own hands—they never tire of this unbreakable, lasting Christmas Gift.

The more logs a child has, the more things he can build

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Enclosed is $..... for Logs specified above. It is understood that you will refund money if for any reason I should return them after 5 days. Send to

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FREE TRIAL

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Free trial coupon will bring you these genuine German War Glasses purchased at exceptionally advantageous rates of exchange.

Manufactured by most prominent of German optical factories. Many were received direct from the Allied Reparations Commission. Conservative $20.00 value.

Finest achromatic day and night lenses. 40 m.m. objective. Dust and moisture proof. Pupillary adjustment. Built for service, regardless of cost, according to strictest military standards. All glasses guaranteed in perfect condition. We have sold 80,000 pairs of this model to date.

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Largest importers of field glasses in America

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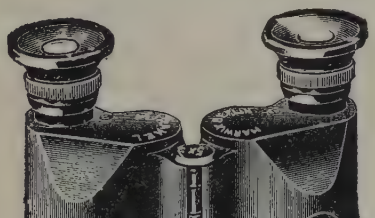

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A GLASS WORTH LOOKING INTO

Playgrounds and Nature

Remember that the playground and local park have possibilities far beyond the iron athletic apparatus and the baseball diamond, urged Prof. William Gould Vinal, of New York State College of Forestry, in an address at the annual meeting of the Playground and Recreation Association of America at Asheville, N. C. Professor Vinal represented the American Nature Association at the meeting, and took an active part in its deliberations. In his address he emphasized the opportunity and need of building up a Nature interest in the local recreation center. He brought out that such activities can be developed in many ways and that they establish an important ground work for Nature and recreation manners in our State and National Parks.

A Good Suggestion

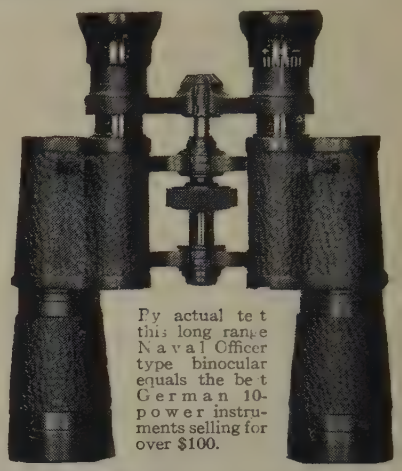
Commenting on the bluebird article in the July issue of NATURE MAGAZINE, Miss M. Louise Bacon, of Hartford, Conn., suggests a way of feeding young birds when conditions of climate are such that earthworms and insects are not easily available. She says that "for many years I have been most successful in rearing wild baby birds dependent on animal food by giving them raw beef and occasionally beef liver. As both are always easily obtainable, I have found it satisfactory to cut the meat into strips the size of a small earthworm and from the scissors drop them into the gaping mouths of the youngsters. One or two strips at a time will bring peace and quiet. During the day a little soft bread and milk adds to the success of the menu. It is astonishing to see how quickly the youngsters find their own way to the soft food."

Harlequin Ducks

"Harlequin ducks have been seen several times in the Yellowstone River near Tower Falls," says the Nature Notes of the Yellowstone National Park. "On one occasion there were two males and a female in one group just above the Yellowstone bridge, while a pair that seemed mated were in the river a few hundred feet below the bridge. Here conditions conform to recorded breeding habits of the species. The ease with which these ducks swim upstream in the swift current is remarkable. Another frequent practice is for them to climb out on a rock and doze for a few minutes. The Harlequin is a rare species in the United States, its proper home being in the far north."

"Would be cheap at $50"
—says Navy Man

"I cannot see," writes Mr. Harold G. Gould, of Northome, Minn., "how such a glass can be sold for anything like the price you ask; $50 would be cheap enough for such a fine instrument."


By actual test this long range Naval Officer type binocular equals the best German 10-power instruments selling for over $100.

This 10-Power Stereo-Prism BINOCULAR

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Order Direct from This Ad

We will send you this fine instrument under our absolute money back guarantee. Examine it without obligation. Either the glass makes good with you or we return your deposit instantly. The next lot of these famous glasses will cost more. Just mail the coupon now, with remittance, before this big bargain offer is withdrawn.

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You may send me the French 10-Power Stereo-Prism Binocular, as described. I enclose remittance of $27.00, but you are to return it promptly if I decide to return the glass for any reason.

☐ Check this square if you wish us to send our catalog only.

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"Sport" in South Africa

We quote verbatim two news notes printed in the *Natal Advertiser* on July 28, 1925, and sent to us by a member, Mr. W. O. Cook, of Durban. These notes, the first from Pietersburg and the second from Graaff-Reinet, tell their own story:

"Sickening reports are to hand of the tragedies being enacted in the bushveld. The biltong hunters are in parties of up to thirty strong, and their sporting idea is to lie in waiting at water holes and slaughter wholesale as the wildebeeste and any other game arrive to slake their thirst.

"As there are no license charges, these nimrods can afford to be magnanimous to the carnivora, merely cutting off the hindquarters and leaving the balance to be so consumed or to rot. One sporting crowd accounted for seventy wildebeeste in one day."

To this second note Mr. Cook appends "and this is a sheep country."

"Game being scarce for the poorer classes, hunting expeditions are often organized against the wild ostriches still running on certain farms in the neighborhood. These are the descendants of birds which were formerly carefully farmed, but which since the feather slump have been left to their own devices on the veld.

"It is no uncommon sight to see a wagonload of twenty or more dead ostriches coming into town, the carcasses being used as fresh meat or made into biltong."

A Season's Observation

Between June and September forty-three different birds were observed in the vicinity of his home at Woodside, Md., writes John H. Fales, an informed observer despite, or, perhaps, because of, his eleven years. The birds observed were: Mockingbird, Blackbird, Redstart, Brown Thrasher, Blue Jay, Catbird, Towhee, Bob White, Flicker, Red-headed Woodpecker, Robin, Goldfinch, Wood Thrush, Bluebird, Cardinal, House Wren, Chipping Sparrow, Crow, English Sparrow, Barn Swallow, Buzzard, Maryland Yellow-throat, Indigo Bunting, Scarlet Tanager, Downy Woodpecker, Pewee, Tennessee Warbler, Hummingbird, Kingbird, Dove, Phoebe, Song Sparrow, Chickadee, Yellow-throated Vireo, Black and White Warbler, Chimney Swift, Black-billed Cuckoo, Carolina Wren, Cowbird, Baltimore Oriole, Red-winged Blackbird, Starling, Yellow-breasted Chat.

You Can Make Good "Movies" of Natural Subjects with

Filmo REGISTERED

A compact, light-weight, automatic camera which gives the quick, convenient "shot" necessary in photographing wild life. No tripod to "set up," no crank to turn. Just train Filmo on your subject and press the button. What you see, you get.

Use Cine Kodak non-inflammable film. Cost of film is only $6.00 per reel. Developed free ready for projection.

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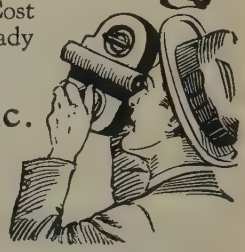
110 West 32d St., New York



Magnified 225 Diameters

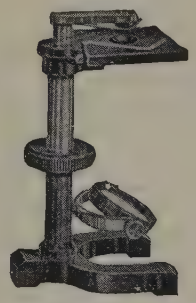
This is what the tip of a fly's leg is like when seen thru the

Ultralens Microscope

At last the high powered microscope is within the reach of all who wish to study, observe and experiment with the vast world of minute objects that are invisible to the naked eye. A remarkable discovery enables us to manufacture the Ultralens Microscope (magnifies 225 diameters) for **one-eighth the usual cost.**

$7.50 for Complete Outfit, prepaid

EASY TO USE



Any amateur can immediately start using his Ultralens to examine the edge of a razor, the mesh of a cotton shirt, the bacteria in dirty water. No technical training required, yet hundreds of scientists and teachers are using this instrument today. It is at once interesting, instructive and scientific. Gives enormous magnification and perfect definition.

COMPACT

The Ultralens Microscope comes packed in a beautiful Leatherette case with full instructions that any one who can read can understand. Lenses of 125 x and 325 x objectives can be furnished at $1.50 each.

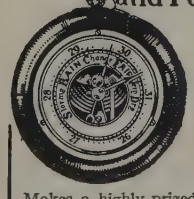
ORDER TODAY

Order direct from this advertisement and get your Ultralens Microscope now. Fully guaranteed. If, however, you desire more information before purchasing we will gladly send free descriptive catalog.

SCIENTIFIC APPARATUS CORP.

Dept. 205 MILTON, PA.

OWN A BAROMETER—and Foretell the Weather



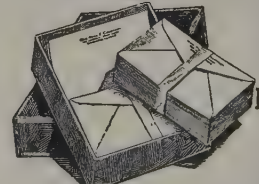
This reliable Barometer enables you to predict accurately any change in weather 8 to 24 hours in advance. Scientifically constructed, attractive in appearance. Highly polished mahogany case, silvered metal dial, heavy bevel glass front. Size 5½ inches.

An Ideal Gift

Makes a highly prized and lasting gift. Educational, useful and interesting. Indispensable to motorists. Should be in every home. Fully guaranteed; postpaid to any address on receipt of $5.00

DAVID WHITE, Dept. 22, 419 E. Water Street Milwaukee, Wisconsin

200 Sheets 100 Envelopes $1.00 POST PAID



High grade, clear white bond paper—unusually smooth writing surface. Size 6 x 7 inches with envelopes to match. Has that crisp, crackly "feel" that identifies it to everyone as superior quality stationery.

Name and Address Printed Free

on every sheet and envelope in rich dark blue, up to 4 lines. Type is Plate Gothic, designed especially for clearness and good taste.

Makes a personal stationery you will be delighted to use. An ideal gift with your friend's name. Attractive 3 letter monogram if preferred.

Just send $1.00 (west of Denver and outside U.S., $1.10) and this generous supply of stationery will come by return mail, postage prepaid. Securely packed in a sturdy blue box. Please write or print clearly. Prompt service and satisfaction guaranteed or money refunded.

National Stationery Co., 1458 Lincoln Highway, Batavia, Illinois

Enjoy your canary to the utmost by keeping him healthy and singing. That is what the contents of Kaempfer's Junior Canary Food-kit will do. The Highballs give exercise and prevent hunger. The Birdolene is a well-established song stimulator. Send in your 56 cents today. We mail this Food-kit postpaid and include Free—the canary call and a booklet on "The Care and Treatment of Canaries."
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Baltimore Oriole
Pictures—7x9 inches

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Send for them!
The loveliest color pictures in existence—made from the famous MUMFORD plates, accurate and authentic! Order these beautiful color pictures of the birds, flowers, fruit, animals, minerals, etc. They create enthusiasm for the beautiful things of nature. You'll need them this fall. Ideal for school-room or home.
Send one dollar for 30 pictures, complete list of 650, and Mr. Dodson's fascinating catalog "Your Bird Friends and How to Win Them."
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Feed the Birds
Put out
THE PACKARD
Automatic Food-House
Keeps the food dry; feeds automatically; avoids waste; lasts years; weighs 2 pound and a half.
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SPECIAL MIXTURE BIRD FOOD
A balanced ration; best for the birds; best for use in the food-house
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Valued at $12.00. Our special introductory price is $6.00. We pay the postage. Your money back if not satisfactory. Only a limited number will be sold, so send your order at once.
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514 18th St., Racine, Wisconsin

Redwoods Abroad

Of all plants growing within the borders of the Golden State none is so widely known throughout the world as the mighty redwood. Seeds of these trees were sent many years ago to various countries. Climatic and soil conditions in New Zealand appear to be peculiarly suited. Several small experimental plantations have made such rapid and satisfactory growth that the government there and several private corporations are growing large numbers of seedling trees for forest planting. A few of the redwoods growing in New Zealand are old enough to produce seeds, and Prof. Woodbridge Metcalf, of the Forestry Division of the University of California, has just received a quantity of seed collected there. Tests to determine the effect of the ocean voyage on the viability of the seed will be carried on and compared with similar tests conducted in New Zealand. Seedlings will be grown in the forest nursery on the campus at Berkeley, and they will be carefully watched to determine if the long sojourn of their parents on foreign soil has given them any suggestion of alien characteristics.

New Wild Life Refuge

President Coolidge, by a recent executive order, has withdrawn from settlement, location, sale, or entry, all islands owned by the United States in the Mississippi River between Rock Island, Ill., and Wabasha, Minn., and has reserved them for the use of the Department of Agriculture in connection with the establishment of the Upper Mississippi River Wild-life and Fish Refuge. The islands are withdrawn in order that the Department of Agriculture may hold them as parts of the wild-life refuge from the start instead of having to buy them later from private owners.

A Big Business

A total of $986,646 was turned into the U. S. Treasury from the National Forests of California during the fiscal year ending June 30, 1925, according to statement by the San Francisco headquarters of the United States Forest Service.

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Imported Japanese and American Fish, Aquatic Plants, Castles, Globes, Food. We make artistic aquariums suitable for beautiful homes, conservatories, schools, the office, etc. Illustrated circulars free.
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With Thoughts of Spring
For Old or Young
In City, Town or Country

No. 1 No. 2
Cozy Cots for Feathered Friends
Above forms, Nos. 1 and 2, complete and ready to hang. Each $1.25, postpaid.
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BIRD FILLING STATIONS

No 1, price $1.25
Patent pending. No. 1 to hang from tree or bracket.
Feed the Birds now and keep them with you this winter.
—AUTOMATIC—
Suet always clean and accessible to last particle.
For smallest home or largest estate. Every home should have several.
Postage paid in U. S.

No. 2, price $1.00
Patent pending. For window casings, porch columns, etc.
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Those who know how, find it easy to make incomes of $3000 a year and more even on very small acreage. There is big money in poultry if you follow the right plan. Start as small as you like—grow fast.
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Weight of 3, 9 lbs.
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Have More Birds This Winter Than Ever Before
$1.00 brings you
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where you can keep them safe and enjoy them always.
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10¢ Buys 100
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The Red Assassins

"It was during the summer of 1912 in Princeton University," writes Ernst Keil of Denison University, a frequent contributor to NATURE MAGAZINE, "on passing Nassau Hall, one of the oldest buildings on the campus, I noticed a number of red squirrels on the lawn near the building. There always were squirrels on the campus, but I had never seen more than one or two at a time. So I decided to investigate as soon as I could spare the time. A few days later Mrs. Keil and I went over and settled in a comfortable spot, intent on finding out what the thing was that attracted these squirrels to same locality.

"It did not take long to solve the mystery, and what we found was murder, plain and simple. Nassau Hall has all its walls covered with a thick growth of ivy, and that heavy tangle of ivy had been selected by great numbers of English sparrows as a nesting place. While it was, of course, impossible to count accurately all the nests, I dare say there were over a hundred of them, and they were, quite naturally, in all stages of development—some with eggs and others with young ones. The red squirrels had found the nests and were rifling them in the most business-like way one can imagine. Never before or after have we witnessed such a wholesale slaughter of young birds. The only interruption took place when one of the red assassins became so gorged with bird meat that it was a physical impossibility for him to hold any more. They kept up their bloody banquet until the last bird had been devoured, and by that time they were so fat and sleek they had difficulty in navigating a tree."

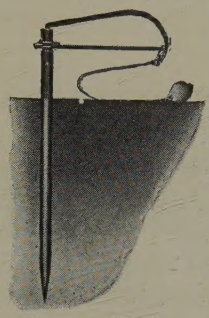
A Flying Lesson

John L. Purington, of Brunswick, Maine, recently discovered a young chickadee, just feathered out and apparently over-bold in trying its wings, because it had fallen to the ground. He picked it up and while holding it in his hand the mother bird arrived with a worm, lit on Mr. Purington's fingers and fed the youngster. She tried to tease the little fellow to fly but to no avail. Finally Mr. Purington placed the baby on a fence post and watched. The mother secured an insect of some kind and would offer it to the baby, taking it away just before the eager bill grasped it and flying out of reach. This was repeated many times until at last the youngster gathered new courage and flew after the mother—and the bug.

GOLF CALISTHENICS

A good game is only possible when **golf muscles** are exercised regularly. After the fundamentals of the game are learned, most golf faults develop from a stiffness or tenseness at some point in the swing.

With the DURABLE CAPTIVE, a smooth, rhythmic stroke can be developed, which when accomplished, eliminates golf ailments, as every shot from the Tee to the Cup is controlled by the same muscles.



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THE DURABLE CAPTIVE
Guaranteed Against Breakage

It is built to withstand a shock much greater than is ever applied when hitting the ball and our guarantee covers replacement of any defective part free of charge—normal wear and tear on ball excepted. Golf Professionals tell us it is the most practical device of its kind they have ever seen.

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Inclosed please find $5.00 for which please send me Indoor $5.00
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with both attachments
West of Rockies 50 cents extra

Name.....
Street.....
City.....

After long wear when the ball needs replacing, new ball, swivel and cable may be secured for $1.25.

Also supplied with beautiful Gift Box

Pat. Pdg. Indoor Model

For Your Boat

Elto (41)

(Designed and built by Ole Evinrude)
Quick Detachable
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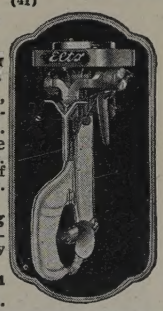

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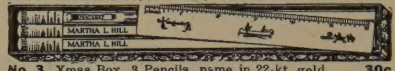

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THE TREE-PLANTING ARMY

Women's Clubs Start Fall Tree Campaign
Education Week Tree Day Is November 19

The message of the Tree-Planting Army has been heard in Japan, the Philippines and Hawaii. Requests for tree-planting and town forest organization information has been received by the American Tree Association from Noborn Tanikawa of the Tokio Municipal office; Pablo C. Payawal, the secretary to the mayor of Manila, and from Lieut. J. B. Hafer, Fort Kamehameha, Hawaii.

* * *

Thursday of American Education Week, November 16–22, has been set aside as Conservation Day, when natural resources and forest fires will be the topic. "Plant a Tree" is one of the slogans for the day on the call issued by John J. Tigert, the Commissioner of Education. Tree-planting instructions for the day and tree-day programs are being sent out by the American Tree Association.

* * *

The fall educational campaign was opened by the women's clubs in many states during October. One of the first reports is from Mrs. Walter Bowman, of Wisconsin, who had a conservation exhibit at the state federation meeting at Green Bay, where the Town Forest booklet and application blanks for membership in the American Tree Association were given out at the conservation conference.

* * *

In Georgia Mrs. Don T. Barnes has sent out a forestry call to the Eighth District. It is Georgia that has just passed a forestry law, and on the State Forestry Board Governor Walker appointed Miss Alice Baxter, who long has been an advocate of forestry. Mrs. Barnes expects to enroll a thousand new tree planters in the Tree-Planting Army, she informs Charles Lathrop Pack, the president of the American Tree Association.

Ohio women are continuing their educational work, information having been sent to the workers there at the suggestion of Mrs. Paul N. Geiger.

* * *

From Camp Pinecliffe in Maine, fifty registrations in the Tree-Planting Army have been made by Esther Hamburger.

* * *

At the direction of Mrs. Robert W. Josserand, the Seventh District, Chairman of Conservation, Kansas women are receiving the message of tree planting and town forests. The booklet is for distribution to conservation chairmen.

* * *

A big tree-planting campaign is on in Oklahoma, where C. W. Kelly, educational director of the State Fish and Game Commission, is directing the work. He expects to see fifty thousand trees planted by Boys' Clubs, Scouts and schools.

* * *

On Founder's Day, October 31, the Girl Scouts established tree-planting records in honor of Juliette Low, the founder of the organization. A call to join the Tree-Planting Army is being answered by the Camp Fire Girls in their hundreds of groups throughout the country.

* * *

In cooperation with the North Carolina Agricultural Extension Service, the North Carolina Pecan Growers Society, of which W. N. Roper is the secretary, is putting on a tree-planting drive in the schools. The American Tree Association is to register all the tree planters on the national honor roll.

* * *

At the Treasure Island Camp of the Philadelphia Boy Scouts 2,000 trees have been planted according to the report of T. G. Cairns, the program director.

The National First Aid Association reports tree planting in honor of Clara Barton at Bremen, Indiana; Mt. Union, Iowa; Milbank, South Dakota; South Londonderry, Vermont.

* * *

The schools of South Vernon, Mass., have taken up tree planting at the direction of Nathalie M. Carr.

* * *

In the Pittsburgh Public Schools Arbor Day programs were carried out, one of the first to register being the Friendship School where Annie L. Lafferty directed the work.

* * *

At Kent, Ohio, the State Normal College plans to set aside an acre of the campus for planting to nut trees. May H. Prentice has charge of the plans.

* * *

In Cleveland the tree planters started early with their plans. The Silver Fox Tribe of the Lone Scouts was one of the first organizations to get tree-planting instructions. Hundreds of applications were received from schools.

* * *

At the direction of O. O. McMillin, of the Bronough, Mo., schools, sixty pupils have registered their trees on the Association's honor rolls.

* * *

At McPherson, Kans., the Rotary Club and the Cooperative Club joined in a community tree planting at which several thousand trees were placed during the month of October.

* * *

The only way to join the American Tree Association is to plant a tree and register it with the Association, 1214 Sixteenth Street N.W., Washington, D. C. The Association will send tree-planting suggestions and a tree-day program for two cents to pay postage.

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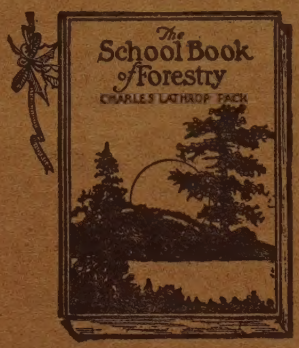

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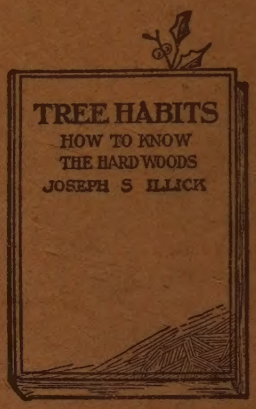

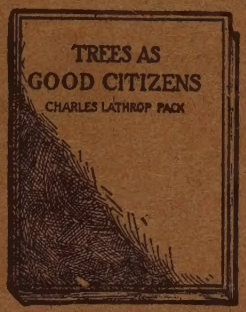

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